

HORTICULTURAL ABSTRACTS

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Initialled abstracts and reviews are by R. V. Harris, H. B. S. Montgomery, and H. Shaw, of the East Malling Research Station, and by G. St.C. Feilden, W. Filewicz and G. Fox Wilson.

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N.B.—Numbers subdivided alphabetically refer to items noted but not abstracted.

MISCELLANEOUS.

Growth substances.

1. VAN DER LEK, H. A. A. 577.15.04: 631.535
Over het stekken van houtgewassen, in het bijzonder van *Populus*; algemeene gezichtspunten, aanwending van groeistoffen. (On the cuttings of woody plants, particularly poplars; general view, the use of growth substances.) *Overdruk. Lab. Inst. Onderz. Verw. Fruit Groenten, Tuinb. Wageningen*. 24, 1939 reprinted from *Jaarb. Nederl. dendrol. Vereen.*, 1938, dl. 13, pp. 76-87.
This is a general discussion on the rooting of cuttings of woody plants, with particular reference to species of *Populus*, some of which root freely, others only with difficulty. The possibility of applying methods for inducing rooting in the latter is envisaged, and experiments with growth substances in other woody plants, described more fully in another publication (see below, abstract 2) are briefly mentioned.

2. VAN DER LEK, H. A. A., AND KRIJTHE, E. 577.15.04: 631.535
Bevordering van de wortelvorming van stekken door middel van groeistoffen. II. (Stimulation of the rooting of cuttings by growth substances.) *Meded. Landb.Hoogesch. Wageningen*, 1940, dl. 44, verh. 7, 91 pp., bibl. 82.
This is a continuation of the authors' work (see H.A., 7: 816) in the use of growth substances in stimulating root development in cuttings of horticultural plants. It includes a list of over 650 species of plants which have been tested by various investigators, with references to the relevant literature. This is followed by an account of the authors' experiments on 23 species of plants, using mostly β -indolylacetic acid, indolylbutyric acid, α -naphthaleneacetic acid, and, in certain cases, the sodium and potassium salts of indolylacetic acid.

3. R., J. 577.15.04: 634/635
Groeistoffen en hun beteekenis voor de praktische tuinbouwer. (Growth substances and their importance for the practical gardener.) *Cultuur Hand.*, 1940, 8: 212-6; 1941, 9: 2-5, 44-6, 88-90, 128-30, 168-9.

In this series of articles the author discusses the use of growth substances in the propagation of horticultural plants, particularly for the rooting of cuttings. The scope of the six sections is indicated by the headings: I. Introduction, and results obtained on cuttings. II. Manner of application. III. Properties of growth substances other than root production. IV. The problem of simplifying the cultivation of azaleas. V. The propagation of azaleas by applying growth substances simultaneously to scions and rootstocks. VI. The further development of cuttings treated with growth substances. The articles are illustrated by many striking figures from photographs. In No. I there is a table of 37 of the principal plants tested at the University at Ghent.

4. STOUTEMYER, V. T., AND O'ROURKE, F. L. 631.535: 577.15.04
Rooting of cuttings from plants sprayed with growth regulating substances. *Proc. Amer. Soc. hort. Sci. for 1945*, 1945, 46: 407-11, bibl. 5.

In experiments at Glenn Dale, Maryland, the authors used plants of *Buxus sempervirens*, *Ilex crenata*, *Ligustrum* spp., *Weigela floribunda* and others. The following notes are taken from their summary:—These experiments must be considered as preliminary in nature, but they indicate that if plants are sprayed with 2,4,5-trichlorophenoxyacetic acid or its sodium salt in a suitable concentration, the cuttings taken from such plants after a certain interval show essentially the same rooting responses as do cuttings treated with growth substances according to one of the generally accepted

methods. A suggestion that the effect gradually diminishes with time is seen in the two experiments with *Ligustrum amurense*. The experiments indicate the necessity of adjusting the concentration of the spray to the different species of plants in order to obtain the best results, a problem which is present irrespective of the manner of applying growth substances. Whether or not the external effects sometimes observed on sprayed stock plants may persist and cause abnormalities the following season is undetermined. Further investigations are needed on the concentrations, most suitable stages of growth for application, and the time interval between spraying and the taking of cuttings.

5. GRACE, N. H. 577.17.04: 631.535
Responses of plant stem cuttings treated with chemicals in a carrier dust.
Canad. J. Res., 1945, 23, Sec. C, pp. 115-26, bibl. 22.

Plant stem cuttings were treated in a factorial series with talc dusts containing naphthylbutyric acid, nutrient salts, an organic mercurial disinfectant, finely divided silver metal, thiamin, and nicotinic acid. Naphthylbutyric acid treatment increased the number of roots in cuttings of *Physocarpus* and *Iresine*, and reduced the mean root length in *Lonicera*. Nutrient salt treatment increased the number of roots on *Iresine* cuttings and the mean root length in *Lonicera*. Differential effects were found for treatments with naphthylbutyric acid and each of the organic mercury, metallic silver, and nutrient salts. Organic mercury at 50 p.p.m. and metallic silver at 5,000 p.p.m. were similar in their effects. Thiamin and nicotinic acid had no significant effect on rooting response. The methods and results of the experiments are set out in 8 tables. The rooting responses of cuttings of seven plant species over the concentration range from 4,000 to 500 p.p.m. failed to demonstrate any particular merit for naphthylbutyric acid and potassium naphthylhexoate. While these chemicals can be used to stimulate rooting, plant propagators are advised to confine their practical interest to the more readily available naphthylacetic and indolylbutyric acids.

6. BARTHOLOMEW, R. P. 631.531.17: 577.15.04
Seed treatment with plant hormones in crop production.

Bull. Ark. agric. Exp. Stat. 444, 1944, pp. 13.
No significant increase in yield was recorded following the seed treatment of a number of crops, including soybeans for grain, with the following 3 plant hormone dusts: Staymone, Rootone, and naphthaleneacetic acid.

7. VAN STUIVENBERG, J. H. M. 581.163
Parthenocarpie. (Parthenocary.)
Overdruk. Lab. Tuinb. Inst. Onderz. Verw. Fruit Groenten, Wageningen 27, 1943, 7 pp., reprinted from *Vakbl. Biol.*, March 1943.

This is a general review of parthenocarp in its various aspects, with a summary of experiments carried out at the Laboratorium voor Tuinbouwplantenteelt in an attempt to induce parthenocarp by spraying with growth substances.

8. VAN STUIVENBERG, J. H. M., AND VELDSTRA, H. 577.15.04: 633.491

De practische toepassing van remming der spruitvorming bij aardappelen door behandeling met groeistoffen in dampvorm. (The practical application of inhibiting sprout development in potatoes by the use of growth substances in vapour form.)

Meded. Inst. Onderz. Verw. Fruit Groenten, Wageningen, 1942, rks. 1, No. 6, 24 pp., reprinted from *Landbouwk. Tijdschr.*, 1942, 54: 611-32.

Methyl- α -naphthalene acetate was applied as a spray to seed potatoes to determine its action on inhibiting sprouting.

Potatoes in cellars at Amsterdam, sprayed with the ester at 1-4 and 0-5 g. per hl. on 11 December, 1941, and on 7 January, 1942, when examined in March showed but slight inhibition of sprouting. Renewed spraying, however, with 1 g. per hl. on 23 March resulted in a strongly inhibitory effect extending to July. These experiments show that sprayings in December and January with the amounts of growth substances used must be considered as premature. The spraying should be done with the growth substance at 1 g./hl. at the time the potatoes first show sprouting. Spraying earlier with a more concentrated solution has an inhibitory effect but is uneconomic. Experiments in private houses produced useful results: marked inhibitor action was generally obtained after the application of 1 g./hl. from February to May, and the effect lasted for some months; the potatoes kept well and did not, like the non-treated controls, get wrinkled.

9. VAN HOLDER, J. 577.15.04
Aesculine is ook een groeistof. (Aesculin as a growth substance.)
Cultuur Hand., 1945, 11: 127.

A table is given showing the rooting effect of aesculin, used as a powder mixed with powdered charcoal, on cuttings of *Chrysanthemum*, *Sidalcea*, *Fuchsia* and *Saponaria*.

10. ANON. 577.15.04
Benzoëzuur is ook een groeistof. (Benzoic acid as a growth substance.)
Cultuur Hand., 1945, 11: 53.

The writer obtained good results, here tabulated, with number of ornamental plants by dipping the base of the cuttings, before planting, in a mixture of 150 mg. benzoic acid and 50 g. powdered charcoal.

11. ANLIKER, J., AND SCHÜTZ, F. 577.15.4
Versuche mit Wuchsstoffmittel "Roche 202".
(Trials with the growth hormone Roche 202.)
ForschErgebn. Geb. Gartenb., 1942, H.1, pp. 24-8.

The effect of Roche 202 on the rooting of cuttings was tested in six species. Only in one case—*Cotoneaster adpressa*—did the treatment show some promise of being commercially useful.—Wädenswil Research Station.

12. SÖDING, H., AND FUNKE, H. 582.822.3: 577.15.04
Über die Förderung der Pflanzenentwicklung durch Hefeauszüge. (The promotion of plant development by yeast extracts.)
Angew. Bot., 1943, 25: 378-90, bibl. 4.

Yeast extracts were made by boiling yeast in tap water for 20 min., filling up to the original volume and filtering. Soaking carrot seed in yeast extract gave a slight increase in yield, while onions failed to respond to seed treatment. The watering of plants with yeast extract had a clear beneficial effect on the vegetative development of carrot radishes and soya beans, resulting in increased yield. The most pronounced effect of watering with yeast extracts was observed with radishes and carrots grown in sand, yeast-treated sand plants reaching the weight of plants grown in garden soil. Probably, both the nutrient and vitamin content of the extract contributed to the effect of the treatment. A 10% yeast extract, i.e. 10 g. yeast in 100 c.c. water, gave the best results, while in most trials a response was obtained also with a 1% extract.

Nutrition.

13. VLADIMIROV, A. V. 631.84
Influence of nitrogen sources in the formation of oxidized and reduced organic compounds in plants.
Soil Sci., 1945, 60: 265-75, bibl. 15.

The general acidity and the content of citric and malic acid in the leaves of *Nicotiana rustica* increase when nitrate

nitrogen is available, and decrease when ammonia nitrogen is available; and they fall with an increase in the concentration of ammonia nitrogen and rise with an increased concentration, up to a definite limit, of nitrate nitrogen. Nitrate nitrogen gives rise in plants to conditions stimulating oxidation, whereas ammonia nitrogen gives rise to conditions stimulating the reduction processes. The organic acid contents of plants under ammonia or nitrate nutrition are inversely related to the potential of the reducing capacity of the plant juice. Ammonia, in contradistinction to nitrate and nitrite nitrogen, stimulates the greater storage of caoutchouc in the roots of kok-saghyz. Under nitrate nutrition not only do the citric and malic acid contents of plants increase, but there is likewise an increase in other valuable organic acids, particularly ascorbic acid (vitamin C). Under ammonia nutrition, on the other hand, there is an increase not only in the caoutchouc content of the kok-saghyz, but also in other reduced products such as pyrethrin in the Dalmatian daisy and volatile oils in essential oil plants. [From author's summary.]

14. ČAILACHJAN, M. H. 581.145.1: 631.84
Flowering in different plant species as a response to nitrogenous food.

C.R. Acad. Sci. U.R.S.S., 1945, 47: 146-9, bibl. 10.
The experimental data cited in this work and in the preceding papers by the same author (*ibidem*, 1944, 43: 387-90; *I.A.*, 15: 1083; and 1944, Vol. 44, No. 8) supplemented by data by other authors, allow the plant species investigated to be classed among the following groups according to the way in which they respond by flowering to changes in their nitrogenous diet. Group I. Nitronegative plants, flowering sooner when either entirely starved of nitrogen, or supplied with reduced amounts, or grown on a soil poor in nitrogenous substances. Among these should be classed: (1) wheat, (2) barley, (3) oats, (4) mustard, (5) spinach, (6) alfalfa, (7) clover, (8) salvia, (9) *Clarkia elegans*, (10) perennium. Group II. Nitropositive plants, flowering at an earlier date with a normal or increased nitrogen supply, or when grown on a soil high in nitrogenous substances. Among these plants should be classed: (1) millet; (2) Indian corn; (3) mohar; (4) *Perilla nankinensis*; (5) sunflower; (6) tobacco; (7) cotton; (8) pepper; (9) lettuce; (10) lupin; (11) various species of *Chrysanthemum indicum* and *C. mepho*; (12) *Tagetes erecta*; (13) *Xanthium pennsylvanicum*; (14) *nantia fugax*; (15) *Kalanchoe blossfeldiana*. Group III. Nitronutral plants, whose flowering dates remain constant, irrespective of the nitrogen supply, on soils low in nitrogenous substances, or high in them. Among these should be classed: (1) buckwheat; (2) hemp; (3) soybean; (4) garden-bean. [Author's summary.]-K.A. Timiriazov Inst. of Plant Physiology and Armenian Agricultural Inst.

5. BRAY, R. H. 581.192: 631.842
Nitrates tests for soils and plant tissues.

Soil Sci., 1945, 60: 219-21.
The tests are based upon the formation of a pink dye through the interaction of nitrous acid with alpha-naphthylamine and sulphonic acid in an acid medium. Two methods are described; both employ manganous sulphate, which helps prevent interference from chlorides and gives a more nearly quantitative reduction of nitrate to nitrite.

6. RUSCHMANN, G., AND OTHERS. 631.87
Einfluss des Handelshumusdüngers "Nettolin" auf das Pflanzenwachstum und die Bodeneigenschaften. (The effect of the humus fertilizer Nettolin on plant growth and soil properties.)
Bodenk. Pflernähr., 1943, 32 (77): 35-85, from abstract *Zbl. Bakt.*, Abt. II, 1944, 106: 390-1.
A permanent manurial trial carried out since 1935 showed that the humus fertilizer Nettolin had a beneficial effect on chemical and physical soil properties in comparison with mineral fertilizers and—to some extent—with stable manure.

17. MEIER, K. 631.416: 635.1/7
Ueber den Gehalt gärtnerisch benützter Böden und Erden an leicht löslicher Phosphorsäure und leicht löslichem Kali. (Available phosphoric acid and potash content in horticultural soils.)
ForschErgebn. Geb. Gartenb., 1944, H.5, pp. 38-45.

One hundred and sixty-two samples of horticulturally used soils were analysed at Wädenswil. Of freshly ploughed up grassland soils about 55% showed phosphoric acid deficiencies and about 82% potash deficiencies, as against nil and 12% and nil and 20-4% in compost and garden soils respectively. 27% showed a weak acid reaction, while all the rest were alkali to a smaller or greater degree.

18. ROBINSON, W. O., AND EDGINGTON, G. 631.811.9
Minor elements in plants, and some accumulator plants.

Soil Sci., 1945, 60: 15-28, bibl. 40.
Certain plants take up particular elements in quantities very far above the average quantity for "normal" plants. Such accumulator plants are discussed in relation to the elements aluminium, arsenic, barium, boron, cobalt, copper, fluorine, iodine, manganese, molybdenum, selenium, silicon, vanadium, zinc, and the rare earths.

19. HAMNER, K. C. 631.811: 577.16
Minor elements and vitamin content of plants.

Soil Sci., 1945, 60: 165-71, bibl. 32.
Little work has been done in this field of minor elements in relation to the vitamin content of plants. It seems probable that variations in the ascorbic acid content of plants such as might be encountered under field conditions are influenced so markedly by differences between varieties and by climatic conditions that the possible influence of soil conditions and fertilizer practice will be found to have little practical importance. With respect to both carotene and ascorbic acid, results indicate that those treatments which are likely to give the highest crop yield per acre are also the ones most likely to give the highest vitamin yield per acre. [From author's summary.]

20. BAUDISCH, O. 631.811
Biological function of minor elements.

Soil Sci., 1945, 60: 173-84, bibl. 12.
The writer has made an approach to the use of magnetism as a tool to solve biological problems. The experiments of other investigators, and of his own described in this paper, "touch the fundamental principles of respiration and penetrate into the obscure realm of biochemical synthesis". After dealing with general considerations the writer discusses the significance of magnetochemistry in the enzymatic system, and the protein component of enzymes. The subject matter only indirectly concerns horticulturists.

21. STEINBERG, R. A. 631.811
Use of microorganisms to determine essentiality of minor elements.

Soil Sci., 1945, 60: 185-9, bibl. 4.
The mineral requirements of *Aspergillus niger* agree with those of the green plant except for calcium, silicon, and boron, though other fungi may be found to require calcium, silicon, and boron. It can therefore be used as a test organism when accuracy, speed, and precision are necessary; or when aseptic conditions or those of extreme purity are required. Comparative studies of its requirements and metabolism with those of other fungi and green plants should aid in revealing the biological functions of the chemical elements in plants. [Author's conclusions.]

22. PHILIPSON, T. 546.27
On the microdetermination of boron.

Ann. agric. Coll. Sweden, 1944-45, 12: 251-8, bibl. 9.
A method of determining boron in quantities from 0.2 to 10% in the sample by the use of curcumine is described.

23. HAAS, A. R. C. 631.811.8
Influence of chlorine on plants.
Soil Sci., 1945, 60: 53-61, bibl. 71.
The influence of Cl upon plants depends upon the nature of the plant, the growth medium, and the climatic conditions. Sand and solution cultures have indicated a beneficial effect of Cl for the growth of tomatoes, cotton, buckwheat, and peas. Field tests with potatoes, tobacco, and asparagus have shown improvement in the crops when low concentrations were used. Physiological response to Cl may be the result of slight changes in acidity and of enzyme activation. The Cl content of tobacco was highest in the upper leaves of the plant, and gradients in Cl distribution occur also in avocado leaves and fruits. [From author's summary.]
24. COOPER, H. P. 631.811.6
Certain factors affecting the availability, absorption, and utilization of magnesium by plants.
Soil Sci., 1945, 60: 107-14, bibl. 20.
Magnesium and its role in plants are discussed under these headings: intensity of removal of cations from soil by electro dialysis; significance of ionization potentials to cation exchange; relation of solubility of magnesium compounds to availability of magnesium and its loss in drainage water; intensity of absorption of nutrient ions by plants; relation of strength of nutrient ions to quality of light utilized in photosynthesis; relation of climate, soil type, fertilizer, and liming practices to magnesium deficiency. The magnesium requirements of most soils can be supplied by a broadcast application of a ton or more per acre of dolomitic limestone, which will supply the magnesium requirements for a number of years. The use of dolomite in the production of non-acid-forming complete fertilizers will usually supply the annual magnesium requirement for most crops.
25. MCHARGUE, J. S. 631.811.9: 546.711
The role of manganese in agriculture.
Soil Sci., 1945, 60: 115-8, bibl. 31.
From the work carried out by the author and others it is shown that manganese is an essential element in the economy of soils, plants, and animals; that some areas of soil are deficient in manganese and therefore produce crops inferior in quantity as well as in food quality; and that manganese can be made unavailable in some soils by the application of an excess of basic materials, including calcium carbonate, in the form of ground limestone, marl, hydrated lime, or burnt lime. When different species of plants are grown on the same type of soil they show a considerable range in manganese content. The leguminous plants usually contain the least amount of manganese, and the grasses the greatest amount.
26. NILSSON, R., ALM, F., AND BURSTRÖM, D. 546.711: 631.811.6
Mangan als Vertreter für Magnesium im Betriebsstoffwechsel und im Baustoffwechsel der Zelle. (Manganese as a substitute for magnesium in the metabolism of the cell.)
Arch. Mikrobiol., 1942, 12: 353-76, from abstract *Zbl. Bakt.*, Abt. II, 1944, 106: 373-4.
In yeasts and *Azotobacter chroococcum* magnesium proved to be replaceable by manganese. The authors do not think that manganese could function as a substitute for magnesium in higher plants.
27. HOAGLAND, D. R. 631.811.9: 547.25.77
Molybdenum in relation to plant growth.
Soil Sci., 1945, 60: 119-23, bibl. 16.
A general review of molybdenum in relation to plant growth, with special mention of molybdenum deficiency with reference to agricultural conditions, and the toxicity of molybdenum.
28. TRELEASE, S. F. 546.23: 581.192
Selenium in soils, plants, and animals.
Soil Sci., 1945, 60: 125-31, bibl. 29.
This review is introduced by the statement that selenium is the only mineral element known to be absorbed by food and forage plants in sufficient amounts to make them lethal when consumed by animals. This element has thus been studied chiefly in relation to forage plants. Some plants particularly certain species of *Astragalus*, accumulate selenium in their tissues.
29. RALEIGH, G. J. 546.28: 581.192
Silicon in plant growth.
Soil Sci., 1945, 60: 133-5, bibl. 5.
The part that silicon plays in plant metabolism is summarized with special reference to work by the writer himself, who found that, in culture solutions containing silicon, plants (beetroot) made rapid growth and had green foliage, while plants in solutions deficient in silicon made very slow growth. Reference is made to work by Wagner who found considerable response to silicon with barley, cucumber, corn, tomatoes, bush beans and tobacco.
30. HARMER, P. M., AND BENNE, E. J. 631.811.5
Sodium as a crop nutrient.
Soil Sci., 1945, 60: 137-48, bibl. 14.
A survey of investigations made in Europe and America regarding the effect of Na on plant growth and the possibility of its serving as an essential plant nutrient bring out the following points among others: Some plants (including a number of garden crop plants) benefit, to a varying degree by Na in deficiency of K, others by Na in sufficiency of K. Sodium apparently has no special function in crops which are benefited only in a deficiency of K. It evidently assists with the functions of K. It appears to have definite functions which it can best fulfil in those crops which are benefited in the presence of ample potash. This is evident in (a) improved vigour of plant and colour of foliage, which continues for a longer growing period, (b) increased disease resistance, and (c) decreased wilting in hot, dry weather. In the absence of K, Na is unable to take over some of the important functions of K, and a physiological breakdown results. The total milli-equivalent content of the four basic K, Na, Ca, and Mg remains fairly uniform whether or not Na is supplied as an additional nutrient.
31. CAMP, A. F. 631.811.9: 546.47
Zinc as a nutrient in plant growth.
Soil Sci., 1945, 60: 157-64, bibl. 24.
The purpose of this paper is to point out some phases of the work on zinc as a plant nutrient which are in need of study. Zinc deficiency in citrus is somewhat heavily stressed, but it has been more widely investigated than that in any other crop. Zinc deficiency in all plants thoroughly studied shows, among other symptoms, some form of leaf chlorosis. The chlorotic areas usually appear between the veins and may vary from white in citrus and corn to light green in some other crops. The availability of zinc varies with the pH, being lower as the pH rises, the critical point being between pH 5.5 and 6.5. On some acid soils availability may be reduced through combination of the zinc with organic compounds in the soil. Reduction in the use of organic fertilizers and the replacement of many natives with cover crops of low zinc requirement plus indiscriminate liming will probably result in greatly increased zinc deficiency in crop plants in the future.
32. SCOFIELD, C. S. 631.432
The measurement of soil water.
J. agric. Res., 1945, 71: 375-402.
Three methods of measuring the quantity of water in the soil at any given time are, the gravimetric, an electrometric, and the tensiometric methods. It was found that the tensiometer yielded precise and useful information on the status of the available water at any given horizon of the root zone.

throughout a range extending from the condition of saturation to that resulting from the withdrawal of 80% to 90% of available soil water.

33. POST, J. J. 631.42
Een onderzoek naar de meest doelmatige wijze van grondmonsterneming. (How to take soil samples.)
Meded. Direct. Tuinb., Jan./June, 1945, pp. 12-20.
This is a critical review of a paper in *Bodenk. PflErnähr.* 1943, 29: 275-91 by Riehm, who found that the K_2O and P_2O_5 content of soils varies considerably from one plot to another; it is considered that, in any particular case, for the analysis of a mixed sample of soil to give a reliable idea of the K_2O and P_2O_5 per $\frac{1}{2}$ hectare, 10 different samples must be taken. The distance between the various samples must not be greater than 15 m.

Noted.

34. a CANNON, W. B., AND FIELD, R. M. 5
International relations in science. A review of their aims and methods in the past and in the future.
Chron. bot., 1945, 9: 255-98.
b CHANG, H. T., AND LOOMIS, W. E. 581.144.2: 581.11
Effect of carbon dioxide on absorption of water and nutrients by roots.
Plant Physiol., 1945, 20: 221-32, bibl. 26.
Material was wheat, maize and rice.
c DONNELLY, W., AND BECK, W. A. 581.12
The respiration of growing plant cells.
Plant Physiol., 1945, 20: 448-52, bibl. 9.
d EMMERT, E. M. 581.192: 631.84
The use of monochloroacetic acid to include ammonia in the chlorate method for total nitrogen in plant tissue.
Plant Physiol., 1945, 20: 307-9, bibl. 2.
e GRACE, N. H., AND FARRAR, J. L. 631.535
Vegetative propagation of conifers. XIII. Rooting of Norway spruce cuttings in the greenhouse.
Canad. J. Res., 1945, 23, Sec. C, pp. 150-65, bibl. 24.

- f HUTCHINSON, G. E. 546.621: 581.192
Aluminium in soils, plants, and animals.
Soil Sci., 1945, 60: 29-40, bibl. 69.
g VAN ITERSOM, G., JR., AND MEEUSE, A. D. J. 576.3
The shape of cells in homogeneous plant tissues. Reprinted from *Proc. Nederl. Acad. Wetensch.*, 1941, 44: 770-8, 897-906, bibl. 34.
h JACK, H. A. 577
Biological [hydrobiological] field stations of the world.
Chron. bot., 1945, Vol. 9, No. 1, pp. 73, \$2.50.
i MITCHELL, H. H., AND EDMAN, M. 546.16: 581.192
Fluorine in soils, plants, and animals.
Soil Sci., 1945, 60: 81-90, bibl. 55.
j MITCHELL, R. L. 581.192: 546.73 + 546.74
Cobalt and nickel in soils and plants.
Soil Sci., 1945, 60: 63-70, bibl. 26.
k NILSSON, F., LAMM, R., AND JOHANSSON, E. 631.42: 634/635
Jordanalyt och trädgårdsodling. (Soil analysis in Swedish horticulture.) Reprinted from *Arsskr. Lantbruks-, Mejeri-Trädgårdsinst.*, 1944, pp. 151-63 as *Meddel. Statens Trädgårdsförsök* 27.
l SHIVE, J. W. 546.27: 581.192
Boron in plant life—a brief historical survey.
Soil Sci., 1945, 60: 41-51, bibl. 46.
m SOMMER, A. L. 581.14: 546.56
Copper and plant growth.
Soil Sci., 1945, 60: 71-9, bibl. 59.
n WALLACE, R. H. 581.1
A simplified recording potentiometer.
Plant Physiol., 1945, 20: 258-66, bibl. 1.
o WALLACE, R. H. 581.1
A simple and inexpensive voltage regulator for laboratory use.
Plant Physiol., 1945, 20: 295-300.
Detailed description and diagrams.
p WRIGHT, K. E. 546.621: 631.85
Aluminium toxicity: microchemical tests for inorganically and organically bound phosphorus.
Plant Physiol., 1945, 20: 310-2, bibl. 5.

TREE FRUITS, DECIDUOUS.

General.

35. ŠITT, P. C. 581.14: 634.1/7
The biological principles of tree and bush fruit investigations. [Russian.]
Proc. Sci. Conf. Timirjazev Agric. Acad. 3-10 June, 1944, 1945, No. 1, pp. 33-7.
In seeking to control the growth and fruit-bearing of plants more completely than the ordinary methods of cultivation allow, the fundamental principles of plant growth must be understood. The relationships between annual, biennial, and perennial, and between herbaceous, shrubby, and tree forms of plants need to be demonstrated by means of a detailed study of the growth and development of plants in all their parts, and under various conditions. The buds merit particular attention; it should be noted, for example, that some buds on a particular tree withstand frost or drought better than others, or that they start into growth sooner, or that the growth lasts longer. Such information should enable the grower or scientist to modify his plants as required.

36. SOKOLOV, M. M. 634.1/7
The revival of fruit-growing in the Moscow province, and its future extension. [Russian.]
Proc. Sci. Conf. Timirjazev Agric. Acad. 3-10 June, 1944, 1945, No. 1, pp. 131-3.
The present state of fruit-growing in the Province of Moscow is discussed, and suggestions for improvement are made. The short article contains nothing of practical interest to fruitgrowers in general.
37. LIBES, R. 634.1/7
Un verger de la Basse Vallée du Gardon. (An orchard in the lower Gardon valley.)
Soc. centr. Agric. Gardon, Nîmes, 1941, pp. 28, fr. 2.50.
A talk given to his local horticultural Society by a successful fruit grower in the fertile and climatically favoured lower Gardon valley, Southern France, summarizing a life's experience in peach, apple and cherry production. In the author's orchard peaches are the most important crop. In 1941 the yield ranged from 12,000 to 25,000 kg. per ha., averaging 16,000 kg. [or roughly 14,240 lb. per acre].

38. DUPREZ, J. 634.22
Le prunier en Seine Inférieure. (Prune growing
in the Lower Seine region.)
Mim. Publ. (out of series) *Soc. centr. Hort. Seine*
Infér., 1944, pp. 9.

From ancient times there has been prune growing in the Lower Seine region, particularly between Duclair and Jumièges. The present state of the industry is described and suggestions are made for an apparently much needed reorganization. Most of the varieties grown are of local origin. Before the war large quantities of Reinette Précoce (or Reine-Claude Davion) and of cherry plums were exported to Great Britain.

39. BRISON, H. 634.1/7(44)
Station fruitière d'expérimentation et de propa-
gande en Normandie. (A fruit research station
needed in Normandy.)
Mim. Publ. (out of series) *Soc. centr. Hort. Seine*
Infér., 1943, pp. 40.

French fruit production has not kept pace with develop-
ments abroad and has not been able to supply more than
75% of the demand at home, which, as elsewhere, has
greatly increased of late. To remedy the situation in the
fruit producing districts of Normandy the establishment of a
fruit research station and of demonstration orchards is
urgently needed. Detailed suggestions for their layout
are made.

40. KELL, J. 634.11(493)
Economische toestand van de appelteelt in België.
(The economics of apple growing in Belgium.)
Cultuur Hand., 1941, 9: 332-7.

This article, written in 1939, gives an account of apple
production in Belgium before the war, discussed under
these heads: 1. Centres of apple cultivation; 2. the economic
importance of apple cultivation; 3. varieties (too many
cookers and too few dessert); 4. methods of cultivation and
standardization thereof; 5. Belgian imports and exports of
apples; 6. apple prices.

41. GERRITSEN, J. D. 634.23(492)
De teelt van kersen. (Cherry growing in Holland.)
Meded. TuinVoorlichtDienst 38, 1944, pp. 78.

Cherries are cultivated in Holland chiefly in four districts,
viz. (1) Betuwe district and the adjoining part of Utrecht,
(2) South Limburg, (3) South Beveland, (4) Uden and
neighbourhood in North Brabant. The author considers
that on the whole the results are disappointing and in order
to increase the yields his recommendations are, (1) cherries
should be planted in permeable, sandy, loamy or light
clayey soil; (2) the varieties should be regular bearers of
well flavoured fruit; (3) care should be taken to ensure
cross-pollination; (4) the cherry orchards should be regu-
larly and heavily manured; (5) pests and diseases must be
controlled by an annual application of a winter wash in
February or March and by spraying with bordeaux mixture
before blossoming.

42. PEARCE, S. C. 634.1/2-1.55
Sampling methods for the measurement of fruit
crops.
Reprinted from *J. roy. statist. Soc.*, 1944, 107:
117-67, bibl. 4.

It is shown that it is possible to estimate the weight of an
apple or plum crop with very fair accuracy by counting the
number of boxes or chip-baskets into which it is picked.
A discussion is included on methods of computing, and the
least number of sample containers that need to be actually
weighed. Methods are given for estimating the mean size
of fruit in crops of apples, pears and plums for the examina-
tion of treatment differences. For apples it is recommended
that a sample of three-quarters of a bushel be divided
equally between the tops of complete stacks of three bushels,
for pears that a similar sample be divided between all
full bushel boxes, and for plums that a sample of 60 fruits

be divided between three containers chosen at random.—
East Malling Research Station. [Author's summary.]

Varieties.

43. POTTER, J. M. S. 634.1/7-1.521
National fruit trials 1921-1944.
Royal Horticultural Society, Vincent Square,
London, S.W.1, 1945, pp. 56, bibl. 17, 5s.

Fruitgrowers are greatly indebted to Mr. Potter both for
the immense care which he has bestowed on the Wisley
trials and for this invaluable, concise account of their
results from the beginning to the present day. A copy
should be in the hands of all who are interested in the
selection of fruit for planting in this country. It will,
moreover, have a much wider appeal, namely to those
interested in the management of similar trials in different
parts of the world.

The original idea was to bring together all new promising
fruit varieties and plants and cultivate them beside standard
commercial varieties, so as to note and compare their
behaviour and qualities. At first responsibility for the trials
lay equally with the Ministry of Agriculture and the Royal
Horticultural Society, but as from 1942 the R.H.S. has, in
fact, been entirely responsible for their maintenance and
supervision. Though it was not possible to reap all the
benefits expected from the use of sub-stations, difficulties
of satisfactory management being found too great, the
trials have given valuable results, as is evident here. Infor-
mation is afforded on the following, among other, points:
(1) number of varieties of different fruits in the standard
collection, ranging from 609 apple varieties to 42 nuts,
the other fruits being pears, plums, black currants, red and
white currants, gooseberries, strawberries, raspberries and
blackberries; (2) choice of varieties for trial; (3) selection
of material for propagation on known rootstocks; (4)
number of varieties for trial (from apples 122 to raspberries
4). Incidentally, trial units consisted of 20 trees of each
variety of apple, pear and plum split up on different
known rootstocks, 20 bushes of each variety of currant
and gooseberry, 30 canes of each raspberry, 100 plants
of each strawberry and 4 plants of each blackberry; (5)
planting distances; (6) layout; (7) locality and meteorolo-
gical conditions. These are not very favourable and
considerable damage occurs from spring frost; (8) the soil,
which incidentally shows considerable mineral deficiencies
over some of its area; (9) cultural methods including
spraying; (10) recording; (11) method of description and
comparison. The standard apples, against which the
qualities of the others are assessed, are, Dessert—Beauty of
Bath, Worcester Pearmain, Ellison's Orange and Cox's
Orange Pippin, and culinary—Emmeth Early, Grenadier
and Bramley's Seedling.

Notes are given of varieties which have shown promise, and
the position with regard to each fruit species is discussed.
It may be noted that conditions at Wisley are unsuitable for
cherries and that cherry varieties have been tested at Borden,
the Kent Farm Institute.

An alphabetical list of all the hardy fruits maintained at
Wisley is included.

Finally, valuable notes are given on the following points:—
comparative flowering periods of a number of apple, pear
and plum varieties; pollination results as between different
varieties within these three species; sulphur-shy apple
varieties; synonyms noted; frost susceptibility, including
notes particular and general; classification of black currants;
influence of rootstocks; incidence of and attempts to check
plum bacterial canker; results at sub-stations.

44. ANON. 634.11 + 634.13(493)
Lijst der variëteiten peren en appels aanbevolen
voor de teelt in hoogstam in België. (List of
varieties of pears and apples recommended for
growing as standard trees in Belgium.)
Cultuur Hand., 1941, 9: 59-62.

In recent years Belgian fruitgrowers have been told of the

advantages from bush and pyramid fruit trees. The writer maintains that standard trees are also necessary and gives this list of suitable varieties, the information being taken from a publication of the same title issued by the Comité National de Pomologie, price 2 fr.

45. REBOUR, H. 634.1/6(65)
Variétés fruitières à cultiver en Algérie. (Fruit varieties recommended for Algeria.)
Doc. Rens. agric. de l'Algérie, Bull. 119, 1945, pp. 15.

Recommendations cover the following fruits:—apricots, oranges, citrons, grapefruit, almonds (green and for drying), cherries, quinces, figs, Japanese persimmons, loquats, olives (oil and table), pecans, peaches, pears, apples (according to season and altitude), plums (both Japanese and European).

46. BRYNER, W. 634.11
Zur Pflege des Glockenapfels. (How to grow the apple variety Glockenapfel.)
Schweiz. Z. Obst- u. Weinb., 1945, 54: 77-80.

Glockenapfel has been officially fostered in eastern Switzerland and is now the most widely grown apple variety in that area. It owes its popularity to its keeping properties and good quality. The article shows, with the help of pictures, how to form the crown.

47. ANON. 634.11: 575.252
Een nieuwe sport van een geliefde appelvarieteit "Roode Cox Orange Pippin". (A new sport of a favourite apple variety, Red Cox's Orange Pippin.)
Cultuur Hand., 1940, 8: 221.

In this article, written up from an account by H. Lütgens in *Gartenbauwirtschaft*, the origin of the Red Cox's Orange Pippin is discussed. It is said to have been found as a single tree in an old orchard of Cox's Orange Pippin and propagated on the Island of Lolland by the Danish fruit-reeder and horticulturist Pallesen. The suggestion is that the variety arose as a bud sport. Another Danish apple, Angried Marie, also known as Red Cox's Orange Pippin, is as not got the keeping qualities of Cox's Orange Pippin. The English variety Crimson Cox is said not to have the true flavour.

Propagation.

48. KRUYT, W. 631.535
Handleiding voor het stekken. (Instructions for striking cuttings.)
Reprinted from *Jaarversl* (1944) "De Proeftuin te Boskoop", 28 pp.

This pamphlet is a review of the "best and most practicable" methods of plant propagation with special reference to the raising of ornamental shrubs from cuttings. The plants are taken in alphabetical order of their scientific names and treated separately. The results are summarized in 5 pages of tables and include the use of growth-promoting substances sold under the names of Rhizopon A (containing dolacetic acid) and Rhizopon B (containing naphthalene-etic acid).

9. ANON. 631.541: 634.1/2
Het snijden van het enthout. (Cutting graft-wood.)
Cultuur Hand., 1940, 8: 223.

This article discusses the conditions under which good graft wood develops, and emphasizes the importance of the freshness of the wood. The twigs for grafting should be cut off in January, or at the latest at the beginning of February, and heeled-in on the north side of a wall, for if placed where they get direct sunlight the buds begin to swell too early: they should be put in the ground just deep enough for the upper buds to show above ground.

50. GEUTEN, —. 631.541
De Swerts-griffelmethode. (The Swerts grafting methods.)
Cultuur Hand., 1942, 10: 67-8.

Two methods of grafting, claimed to be new and as used by Heer Swerts, a Belgian tree-nurseryman, are described and figured. I. The Swerts-cleft-grafting: the graft-stick instead of having the usual 2 or 3 buds has 10, 20 or even 40 buds, and is up to a metre in length. II. The Swerts-infilling-grafting: a method that may be used for filling in bare lengths of branches or stem; the scion is cut with a wedge-shaped pointed base, which is inserted into a sloping T-shaped cut in the bark of branch or stem.

51. ANON. 631.541.5: 634.1/2
Het occuleeren van vruchtbotten. (The technique of fruit budding.)
Cultuur Hand., 1945, 11: 76.

This short article describes and figures the use of fruit buds in budding. The method (a form of shield-budding) is recommended particularly for filling in bare lengths on branches of espaliers. The buds are best taken from 1-year-old twigs of fruitful varieties.

52. FEY, W., AND WINKELMANN, H. 634.1/7
Die neuzeitliche Obstbaumschule, ihre Einrichtung und Bewirtschaftung, unter besonderer Berücksichtigung der Veredlungsunterlagen, Veredlung und Heranzucht der verschiedenen Baumformen. (The modern fruit tree nursery, its establishment and management, with special reference to rootstocks, budding and grafting and training of different tree forms.)
Grundlagen u. Fortschritte im Garten- u. Weinb., Heft 60, 1942, 2nd edition, pp. 166, RM. 3.50.

The subject is treated concisely and thoroughly. In the last chapter extracts* are presented from the regulations governing the German nursery certification scheme.

53. COCHRAN, G. W. 634.25-1.535
Propagation of peaches from softwood cuttings.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 230-40, bibl. 10.

Microscopic examination of peach softwood cuttings which had failed to root suggested that the failure was due to water deficits caused by plugging of the xylem vessels with wound gum. In 1945 propagation benches were enclosed and equipped with atomizers that maintained a continuous mist in the air above the propagating medium. Softwood cuttings of the varieties Elberta and Rochester, taken from 3-year-old trees forced in the greenhouse, were rooted on five different occasions during March, April, and May by treating with indolebutyric acid and then holding in continuous mist. The results suggest that the method may also be applied to outdoor-grown cuttings.

54. TUKEY, H. B., AND CARLSON, R. F. 634.25-1.531
Breaking the dormancy of peach seed by treatment with thiourea.
Plant Physiol., 1945, 20: 505-15.

The dormancy of Lovell peach seed was broken by treatment with thiourea. Of 22 other varieties similarly tested, the dormancy of six was not broken, ten germinated 10%, and all remaining varieties responded to a lesser degree than did the Lovell. Lovell seedlings which developed from treated, non-after-ripened seed were dwarfed. Complete after-ripening of peach seed involves changes in the seed which result in vigorous seedlings free from dwarfish and anomalous characters. The most favourable treatments to break the dormancy of non-after-ripened Lovell seed were soaking for 2 to 16 hours in 0.25% to 0.5% aqueous solution of thiourea or placing in a continuous supply of

* Translation available on application to this Bureau.

0.25% solution. Moulds and common seed-borne fungi were reduced by treatment of seed with thiourea.

55. CARLSON, R. F., AND TUKEY, H. B.

634.25-1.531

Differences in after-ripening requirements of several sources and varieties of peach seed.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 199-202, bibl. 9.

Trials at Geneva, N. York, show that each peach variety and source of seed has specific after-ripening requirements. They indicate that the normal recommendation of 10-12 weeks of after-ripening at 3° to 5° C. is good, provided that it is possible to arrest germination, if it occurs prematurely, by autumn planting or the use of controlled low temperature storage.

Rootstocks.

56. HENKES, H. J. M.

634.22-1.541.11

Handleiding voor de determinatie van pruimonderstammen. (Manual for the recognition of plum rootstocks.)

Meded. N.A.K.-B. 38, 1943, pp. 46.

This handbook begins with a historical review of the development of the classification of plum rootstocks. This is followed by a description of the characters of the shoots of the stools or layer rows. These characters as seen in summer and in winter are arranged in two keys for distinguishing the different varieties. Two plates show the characters to be looked for in the buds. Then the 22 different varieties of the keys are described in detail with a plate (from photographs) for each variety, illustrating a shoot with leaves, a leaf (to show shape, veining and dentation), and portions of shoots in winter to show the buds. The book ends with a description of Marunke (Ackermann's plum) which has received much approval in Germany in recent years, particularly as a rootstock for peaches and apricots.—Horticultural Laboratory, Wageningen.

57. TUKEY, H. B.

634.1/2-1.541.11

"Pedigree" nursery stock.

Amer. Fruitgr., 1945, 65: 1: 13, 32-3, 40.

The writer discusses the divergence of fruit strains from the original type, and shows how strains can sometimes be distinguished by budding or grafting. He cites and illustrates two strains of the McIntosh apple, one of which was budded successfully on a particular rootstock (USDA 227) while the other was uncongential (partially incompatible) with the same stock.

58. SUDDS, R. H.

634.11-1.541.11

The effect of Malling I, II and XIII rootstocks on several apple varieties.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 227-9, bibl. 3.

Observations on apple trees planted in 1932/3 at Kearneysville, W. Virginia, indicate that M.II is very satisfactory for producing trees of good yield and much less than standard size with four of the varieties tried. With York Imperial and Gallia Beauty it was not so good. Malling I tended to bring trees into bearing too soon—so that it was necessary to wire and stake them. Trees on XIII grew fairly vigorously, but are not recommended.

59. SPRENGER, A. M.

634.11-1.545.11

Onderstamproeven bij Schoone van Boskoop (Goudreinette). (Rootstock trials with Belle de Boskoop.)

Meded. Tuinbouwlichtdienst 29, 1942, 39 pp.

This is an account of trials with East Malling Research Station apple rootstocks Nos. I to XVII, with Belle de Boskoop as the scion variety. The crops of individual trees over a period of eleven years (1930-1940) are tabulated and set out graphically.

60. BRASE, K. D.

634.23-1.541.11

Observations on growth differences of sweet and sour cherries grafted on to Mazzard and Mahaleb body stocks.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 211-4, bibl. 4.

Trials at Geneva, N. York, with Giant and Montmorency cherries bench-grafted on Mazzard and Mahaleb stocks at a height of 26 inches showed satisfactory unions and indicated that the Mahaleb combination develops into a dwarf tree comparable to apples on Malling IX stock.

Pollination.

61. JOHANSSON, E.

581.162.3: 634.11 + 634.13 + 634.22 + 634.23

Befruktningsförhållanden hos äpple, päron, plommon och körsbär. (Pollination experiments with apples, pears, plums and cherries.) [English summary 2 pp.]

Reprinted from *Årsskr. Alnarps Lantbruks-, Mejeri- Trädgårdssinst.*, 1945, pp. 65-142, bibl. 49, as *Meddel. Trädgårdsförsök* 28.

It was the object of these experiments, carried out at Alnarp, Sweden, on apples (1934-44), pears (1936-44) and plums and cherries (1937-44), to find suitable pollinizer for a large number of varieties known to be self-incompatible. The pollination trial results are set down in table indicating year, number of flowers pollinated, percentage of fruit matured as a result of pollination, estimated fruit size of the same tree as a result of open pollination. Data of pollen germination trials are also tabulated. The principal results of the investigation are summarized by the author as follows: "Apples:—Pollination experiments have been carried out on 110 varieties of apples. Diploid, triploid and tetraploid varieties were tested in the trials, and the following crosses were made: 2n × 2n, 2n × 3n, 2n × 4n, 3n × 2n, 3n × 3n, 3n × 4n, 4n × 2n and 4n × 4n. The tetraploid T 16/36 used as female in these crosses was raised by the author in 1936. It seems to be self-compatible, while the diploid and triploid varieties are practically self-incompatible. More well-developed seeds were produced in crosses 3n × 3n than in 2n × 3n. The following pairs of varieties were found to be cross-incompatible:—2n × 2n, Filippa and Yellow Richard, Ringstad and Åkerö, Stenbock and Wöldikes Pigeon, Transparente blanche and Calville blanche d'hiver. 3n × 2n: Belle de Boskoop and Transparente de Crouleis, Blenheim and Golden Winter Pearmain. Pollination of apples with pears was tried, and mostly gave no fruits. In some cases, however, fruits with seeds matured, but it has not been ascertained whether the seedling from these are true hybrids between apples and pears. Probably they are not. Pears:—Pollination experiments were made on 58 varieties, which were diploids or triploid. The results of these trials indicate that Bonne Louise, Belle Lucrative, Williams, Seckle, Laxton's Superb and Précoce de Trévoux belong to the same group of incompatible varieties. Crossing between the last two varieties, however, has not yet been tried. Plums:—In the pollination experiments reported here 52 varieties of plums were used as females, most of them being self-incompatible. No case of cross-incompatibility was found. The trees which had good pollen and failed to cross were probably of the same variety or forms of the same variety (Abricotée de Tours and Yellow apricot, Hackman and Reine Claude Imperial. Some varieties of plum (First, Shiro and Superior), hybrids of different species of *Prunus*, were crossed with *P. domestica*. First was also crossed with *P. cerasifera*, *P. persica* and *P. cerasus*. Cherries:—Pollination experiments were carried out on 35 cherry varieties. Some of the experiments were made in Ränna, about 90 miles north-east of Gothenburg. The results are tabulated."

62. ÖSTLIND, N. 634.1/7: 581.162.3
Undersökningar rörande pollengröning i konst-
jorda substrat. (Investigations on fruit pollen
germination on artificial media.) [English
summary 1 p.]
Reprinted from *Årsskr. Alnars Lantbruks-
Mejeri-Trädgårdsinst.*, 1945, pp. 145-66, bibl. 29,
as *Meddel. Statens Trädgårdsförsök* 29.

Germination trials with pollen of different apple, pear,
plum and hazel varieties.

63. ROBERTS, R. H. 634.11: 581.162.3
Blossom structure and setting of Delicious and other
apple varieties.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46:
87-90.

It is found that the upright position of the filaments and
spreading petals of the Delicious apple allow honey and
solitary bees to extract nectar without touching the anthers
or pistils in 80% of their visits. It conduces to poor
pollination and may be a factor in other shy-fruited apple
varieties.

64. WANSCHER, J. H. 634.25: 581.162.3
Partial pollen sterility as a somatic character of
the peach.
Yearb. roy. vet. agric. Coll. Copenhagen 1941,
pp. 91-105, bibl. 10.

The author repeated Kobel's investigations, but on a larger
scale, in order to get further evidence on the following
points: 1. Is pollen abortion which is commonly found in
the peach determined only by somatic conditions? 2. Are
there genotypical differences in this respect between varieties?
His material consisted of 64 one-year-old twigs from 18 peach
trees belonging to 12 varieties grown in the gardens of the
college. The twigs were collected just before flower opening.
They were measured and the nodes and flower buds at each
node were listed and marked. The buds were preserved in
alcohol and the pollen was stained prior to microscopical
examination. The percentages of good pollen grains were
calculated after counting 200 to 300 grains from different
anthers of each flower. About 1,000 flowers were examined.
Results show that the percentages of living grains vary
remarkably within the same twig, being highest at the base
and often declining to nil at the ends of the twigs. Variation
in pollen quality in different positions was less pronounced
in varieties which possess good pollen than in others. Pollen
production in the peach seems to depend on growth condi-
tions in the tree itself: thus Early Elberta grown in a cold
greenhouse with a more favourable soil and air temperature
showed twice as good pollen as the best of the open-air trees
examined. The values are discussed. In conclusion the
author sums up as follows:—"The peach *Prunus persica* is a
diploid cytologically regular species which nevertheless
very often shows a lowered pollen fertility. It has been
stated that the pollen quality, as measured numerically by
the percentages of stainable grains, is dependent on the
physiology of the flower and, hence, is to be reckoned as a
somatic character termed diploitic sterility. The question
of the somatic influence upon the partial pollen sterility
in other plants is discussed."

65. CONDIT, I. J., AND FLANDERS, S. E. 634.37: 581.46

"Gall flower" of the fig, a misnomer.

Science, 1945, 102: 128-30, bibl. 8.

The authors show that the dictionary definition of gall
flower in figs ("... degenerate pistillate flowers ...
[which] cannot develop seed, on account of their aborted
ovaries") is incorrect and should be superseded by the
following statement: "Gall flower, a term erroneously
applied to short-styled fig flowers inhabited by insects; such
flowers are normal and show no swelling or excrescences
typical of galls." The achene-like empty ovary, which

may develop in the absence of pollination, has earlier been
designated a "cenocarp" by Condit. For such an ovary
when inhabited by *Blastophaga psenes*, which occupies the
position of the embryo, the name "psenocarp" is proposed.
—Citrus Experiment Station, Riverside, Calif.

Growth and nutrition.

66. COMPTON, O. C., AND BOYNTON, D. 634.11: 581.192

A rapid method for the determination of chlorophyll
in apple leaves.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46:
45-50, bibl. 5.

The method proposed provides a rapid and accurate means
of determining chlorophyll in plant tissue. Transmittance
of light above 610 $m\mu$ is measured in a photoelectric colori-
meter by using a suitable filter, comparison being made
against readings obtained with pure chlorophyll. Certain
precautions as to filtering, sampling, decomposition by light,
and the effect of solvent upon extraction are pointed out.
The seasonal trend in chlorophyll for one orchard is discussed
in relation to yields and fertilizer practice. [Authors'
summary.]

67. JACOBSON, L. 632.191: 581.192: 546.72

Iron in the leaves and chloroplasts of some plants
in relation to their chlorophyll content.

Plant Physiol., 1945, 20: 233-45.

The author's work on pears, corn and tobacco confirms the
conclusions reached by Oserkowsky with regard to pear
leaves [see *Plant Physiol.*, 1933, 8: 449-68], namely that a
relation exists between total iron and chlorophyll content in
the leaves. Before chlorophyll can be formed the total iron
in the leaf must exceed a certain minimum, which is deter-
mined by the species and the growth conditions. Thorough
washing of leaves is a prerequisite for valid quantitative
analyses of iron.—Univ. Calif. Berkeley.

68. BURKHOLDER, P. R., AND McVEIGH, I. 577.16: 581.192

The B vitamin content of buds and shoots of some
common trees.

Plant Physiol., 1945, 20: 276-82, bibl. 7.

Details are given of the content of the buds, leaves and shoots
of the Baldwin apple and a number of other trees and shrubs
from February to May in thiamine, riboflavin, pyridocine,
niacin, inositol, biotin, pantothenic acid and vitamin B₆.
The possible significance of the facts thus established are
discussed.—Osborn Bot. Lab., Yale Univ.

69. LOTT, R. V. 634.11: 581.192

The use of decolorizing carbon to avoid error in the
determination of dextrose in fruits by the Lothrop
and Holmes method.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46:
149-51, bibl. 7.

Results with Jonathan, Yellow Transparent and Golden
Delicious apples and with Elberta peaches show that
decolorization with carbon is highly desirable when using
the Lothrop and Holmes method of determining dextrose
and levulose.

70. LOTT, R. V. 634.11-1.547.6

Changes in reflectance of flesh and skin and in
composition of maturing Transparent and Duchess
apples.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46:
131-42, bibl. 5.

Results of analytical and spectrophotometrical examination
of Transparent and Duchess apples at different dates are
compared.—Urbana, Illinois.

71. GERHARDT, F., AND ENGLISH, H.

634.22: 664.85.22

Ripening of the Italian prune as related to maturity and storage.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 205-9, bibl. 5.

Colour of flesh and solids-acid ratio proved the best guide to time of harvesting. Fruit with the flesh of a medium-to-dark amber colour and a solids-acid ratio of 13 to 15 was judged acceptable for long distance shipment. The storage breakdown liable to occur about the time of ripening was prevented by partially ripening fruit before storage at 31° or by holding fruit at 40° to 45° F.—Wenatchee, Washington.

72. LOTT, R. V.

634.1/2-1.546.7

The terminology of fruit maturation and ripening.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 166-72, bibl. 12.

The author discusses and makes suggestions for the reasonable use of common terms to describe degrees of ripeness and of colour in fruits.

Soil factors and cultural practice.

73. WILCOX, J. C.

634.11-1.4

Some factors affecting apple yields in the Okanagan Valley. II. Soil depth, moisture holding capacity, and pH.

Sci. Agric., 1945, 25: 739-59, being Contr. Div. Hort. exp. Farms Serv., Dominion Dep. Agric. Canada 652.

This paper is the second in a series on the findings of an investigation started in 1937 into the effects of certain factors on apple tree performance in the Okanagan Valley of British Columbia. The general experimental set-up and the procedures used in obtaining the tree records were described in the first paper of the series (see *H.A.*, 15: 977). Soil samples were obtained from each of the 74 plots at depths of 0-8 inches, 8-24 inches and 24-60 inches. Sampling was discontinued at the gravel if it was encountered at a depth less than 60 inches. Gravel content, moisture holding capacity (expressed both in per cent. and in inches of water), lime content and pH were determined for each soil sample. The total moisture holding capacity per profile was used as a combination measurement of soil texture × depth. The deeper, heavier soils had, on the average, higher moisture holding capacities, more lime, and higher pH values than the lighter, shallower soils. In the deeper soils, both the lime content and the pH increased with depth. The coefficients of correlation showed the following trends as outlined by the author:—(1) The heavier and deeper the soil (as measured by the total moisture holding capacity to a depth of 60 inches), the higher was the average pH, the more vigorous were the trees, the less was the degree of biennial bearing, the higher was the total yield, and the higher was the yield of high quality fruit; (2) the higher the pH, the higher was the total yield. However, when the effects of moisture holding capacity were eliminated by partial correlations, there was found to be no direct relationship between pH and yield. No relationship was found between pH on the one hand and tree vigour and biennial bearing on the other. It is concluded that the deeper, heavier soils in the plots chosen showed better promise for good tree performance than the lighter, shallower soils. The data obtained are tabulated in an appendix.

74. WILCOX, J. C., AND KNIGHT, A. T.

634.11: 581.144.2

Some factors affecting apple yields in the Okanagan Valley. III. Root distribution.

Sci. Agric., 1945, 25: 760-75, bibl. 24, being Contr. Div. Hort. exp. Farms Serv., Dominion Dep. Agric. Canada 654.

This, the third paper of the series (see preceding abstract) reports findings on the relationship of root distribution to

certain soil characters and treatments, and to tree performance. Trenches were dug near apple trees receiving a number of different cultural treatments; they were 2 feet wide, at least 5 feet deep and extended from 3 or 5 feet out to 21 feet from the trunk. The soil horizons and roots along one wall were mapped. In addition, trenches were dug near trees in 50 of the McIntosh plots used for the apple nutrition studies, and the horizons and roots were mapped on a pit face 6 feet long and 5 feet deep. The fibrous roots (less than $\frac{1}{4}$ -inch in diameter) were tallied in these 50 trenches, and were correlated with certain soil factors and with tree performance. The degree to which the roots were distributed in the surface horizon appeared to depend mostly on cover crop, cultivation, and irrigation practices. With sod grasses, the cover crop roots tended to exclude the apple roots from the top few inches; with leguminous crops this effect was not so marked. Five factors were found to be definitely related to the concentration of fibrous roots in the soil: (1) depth—the concentration was usually highest between depths of 6 and 18 inches; (2) proximity to tree—the closer to the tree the higher the root concentration; (3) size of tree—the larger the tree, the greater the root concentration, and the greater the spread and depth of the roots; (4) soil texture—a moderately heavy loam containing only sufficient sand or lime to maintain satisfactory permeability, appeared to be the most suitable for the growth of fibrous roots; (5) soil moisture—a high soil moisture accompanied by good drainage gave the greatest root concentrations in plots on the Kelowna Sub-station. Within a pH range of 6.0 to 8.0 the higher pH values were associated with the greater number of roots. The concentrations of available phosphorus and potassium in the soil showed no significant correlation with the numbers of fibrous roots. Heavy applications of borax and boric acid killed the fibrous roots in the surface soil.

75. MEURMAN, O.

634.11-1.536

Trials with apple trees at the State Horticultural Institution, Finland. II. Experiments on the depth of planting.* [Finnish.] (English summary 5 pp.)

Valt. Maatalousk. Julk., 1943, No. 120, pp. 36, bibl. 18.

The author contends that tradition rather than sound scientific knowledge perpetuates, in textbooks and bulletins all over the world, the doctrine that fruit trees require shallow planting. In 1933, at the State Horticultural Institution, Piikkiö, 3 different depths were used for planting 45 seedling-worked apple trees of 12 varieties in good sandy soil, with a clay layer in the subsoil:—(1) Shallow; the trees were placed at the same level as in the nursery; (2) 5-8 cm. deeper, so that the union came on ground level; (3) again 10 cm. deeper. As might be expected from the better chance given to the root system, the more deeply planted trees developed more vigorously, the annual increase in trunk diameter during the first 4 years (1933-36) being 0.69, 0.76 and 0.86 cm. respectively for (1), (2) and (3). When the experiments came to a premature end after the severe winter of 1939-40, the tree weight was found to reflect the difference in treatment in a much more pronounced manner. Since increased vigour was partly associated with delayed bearing, No. (3) treatment cannot be recommended in all cases. From the yield records which are tabulated, it is concluded that deep planting must be considered beneficial for early cropping varieties and shallow planting for late croppers. However, with both types deep planting had the effect of increasing the size of the fruit. Incidentally, the deeply planted trees appeared to show a higher susceptibility to frost, but this character should be related to the greater vigour of the tree and not to the planting method. It is believed that the results obtained are applicable to dwarf trees also. The author thinks that the capacity of the scion to form adventitious roots is generally over-estimated,

* For Part I see *ibidem*, 1940, No. 7; *H.A.*, 13: 759.

especially as the top soil is usually too dry to encourage root development.

76. FEY, W., AND WIRTH, A. G.

631.546: 634.11 + 634.13
Der Spindelbusch, eine Idealbaumform für den Garten des Selbstversorgers und für Erwerbsobstpflanzungen. (The spindlebush [a kind of dwarf pyramid], an ideal tree shape for home gardens and commercial plantings.)

Grundlagen u. Fortschritte im Garten- u. Weinbau, 1944, Heft 58 (6th revised edition), pp. 156, RM. 2.50.

The great success of this book, of which 5 large editions were sold out in wartime within $3\frac{1}{2}$ years, indicates that the Spindelbusch (spindle-shaped tree) must be extremely popular in Germany. What is the Spindelbusch? It has several features in common with the tree type known as dwarf pyramid in England, but there are some important differences: The Spindelbusch is larger, its lateral shoots are tied down horizontally and it is not summer-pruned until it is about 10 years, whereas the dwarf pyramid is summer-pruned from the second year. The authors explain that in respect of the architecture of its top the new creation stands half-way between a bush tree (also called Spindelpyramide) and a perpendicular cordon tree. Unlike the former the Spindelbusch has no proper branch system and unlike the latter its fruiting wood does not issue from the main stem directly, but from short branches. As with the dwarf pyramid, its chief advantages should show up in any short-term programme or in private gardens: given the right conditions, the tree will begin to crop two years or at the latest 3 years after planting, it requires very little room and it is claimed that it remains easily movable for 8-10 years. Briefly, the method of planting and training a Spindelbusch is as follows*: As a rule, E.M. IX is the most suitable rootstock for apples, while for pears quince C, though otherwise ideal, has proved insufficiently frost resistant under German conditions. Prior to planting stakes, 1.50-1.75 m. high (above ground), are driven into the well prepared soil. The planting distance recommended for commercial plots is a 3 m. square, the home gardener should not go below the 2 m. limit or below 2.75 m. for more vigorous varieties on good soils. In the case of planting a 2-year-old tree trained in the nursery similarly to a perpendicular cordon tree, the roots are pruned, the leader is cut back to about 4-6 buds and the lateral shoots to 2-4 buds. The next step in the training of the young tree, viz. *tying down the young lateral shoots* to the horizontal plane in the summer (July) following planting, is the most important operation resulting in abundant flowering the year after. No summer pruning is carried out in addition to tying. As an alternative to tying, labour-saving clamps may be used to bend the young shoots down. (For a description, see H.A., 13: 1187.) Once the shoots have become woody they remain in the horizontal position. In the first winter pruning the leader is cut back to 5-8 buds, so are the stronger lateral shoots, while the weaker ones are cut back to 3-5 buds. The tree has been treated correctly if all buds make moderate growth in the following season. In ordinary circumstances no summer pruning is carried out for approximately the first 10 years. When the blossom has been destroyed by spring frosts and fruit spurs grow out into shoots, the French Lorette method of summer pruning, which is described in detail, was found to give excellent results. Winter pruning in later seasons is performed roughly on the lines noted for the first winter. When a tree shows too much vigour, it is considered a good plan to induce forking in the tips of the lateral branches, where the framework of the top permits. An annual growth of 20-40 cm. can be regarded as indicative of a well-balanced Spindelbusch. Notching or root pruning may be used to adjust vigour. In order to improve fruit

* We hope shortly to have available a full translation of the relevant parts.

quality and yield old fruiting wood is cut out from time to time in July or August and a young shoot is tied down horizontally to replace the old one. Having dealt with the planting and training of the Spindelbusch the authors discuss at length its place in horticulture, describe the manuring practice to be followed and give an annotated list of suitable varieties. At the Limburgerhof research station the following average yields per tree were recorded for the variety Adersleber Calville from the first to the fourth year respectively: 2.2, 2.6, 8.4, 15.2 kg. (maximum yield per tree in the fourth year: 33.9 kg.). The numerous illustrations with detailed captions tell the story of the Spindelbusch in an abbreviated form.

77. ANON.

634.1/2-1.543-544

Fruitboomen tegen muren en spaliere. (Fruit trees against walls, and espaliers.)
Cultuur Handl., 1940, 8: 218-20.

This is an illustrated account of various systems of training fruit trees against walls or as espaliers. The methods of constructing the wooden or iron supports for the espalier trees are described.

78. BROADFOOT, H., AND WHITTAKER, E. C. 634.1
The rehabilitation of pome fruit orchards in New South Wales.

Agric. Gaz. N.S.W., 1945, 56: 384-7, 447-9.

The first part of this article discusses the remedial measures that must now be taken to repair the damage in apple and pear orchards that has resulted from war conditions, with special reference to cultural operations, pruning, grading and packing. The second part deals with the control of fungus diseases and insect pests, reworking, new plantings, and plant and equipment.

79. KILPATRICK, D. T.

634.22-1.542

The pruning of the Japanese plum. A general outline.

Agric. Gaz. N.S.W., 1945, 56: 303-7.

The essential features in the pruning of the Japanese plum are summarized by the author as follows: The shortening back of certain laterals for the development of fruit spurs, the length depending upon the variety; the further shortening back of the same laterals as 2-year-old wood for the selection of a required number of fruit spurs for bearing; the thinning out or shortening back of lateral built or multiple subsectioned spurs or the complete removal of same.

80. ANON.

634.11-1.8

Frugttræernes Gødskning. (The manuring of apples.)

Medd. Forsøksv. Plantek. 285, 1940, pp. 4.

Preliminary results of apple manuring trials, started at Blangstedgaard and Hornum, Denmark, in 1928, were reported *ibid.*, No. 284 (no date) in connexion with soil analysis data. The general conclusions drawn from further experiments may be summarized as follows:—(1) Apple trees should not be limed so long as the pH is above 6. When liming is carried out, the pH must not rise above 7. (2) The potash, phosphate and manganese content of the soil should be judged by the appearance of the tree. Young trees do not require fertilizers as long as they show strong shoot growth (30-50 cm.) and the soil phosphoric acid and potash numbers [*sic*] are above 5 and 6-8 respectively. Nitrogen should not be applied until the trees are in good cropping, unless deficiency symptoms occur. The humus content of the soil is to be maintained by the application of stable manure or the ploughing under of cover crops. (3) Too vigorous growth may be adjusted by grassing down for a couple or more years and too small fruits may be countered by measures which will increase the vigour of the tree, such as pruning, etc. (4) Young trees, as a rule, should not receive more than about 200 kg. potash and half as much superphosphate per hectare, while older, well

bearing trees may be given 2-3 times the amount. Potassium and phosphoric acid should be applied in autumn or winter. When nitrate applications are necessary the suitable dosage of nitrates will often lie half-way between those stated for potassium and superphosphate. Nitrogen should be applied in spring, about one month before bud burst. Modifications of the fertilizer dosages for other fruits are also suggested.

81. S., F. 634.1/7-1.8: 632.19
Bemesting der fruitboomen. (Manuring fruit trees.)

Cultuur Hand., 1945, 11: 58-9.

A brief note on the importance of correct manuring of fruit trees is accompanied by a table giving the symptoms of disordered nutrition, on foliage, roots, branches and fruit, associated with excess or deficiency of particular elements.

82. PROEBSTING, E. L. 631.84: 634.2
Effect of time of application of nitrogen on size and maturity of stone fruits.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 178-82, bibl. 1.

Trials with peaches, prunes, cherries and apricots in widely differing nitrogen status receiving nitrogen at various times of the year indicate that time of application has little effect on size of fruit.—Davis, California.

83. VAN STUIVENBERG, —. 634.23-1.8
Verslag over het onderzoek naar den invloed van de bemesting speciaal met kali, op de kwaliteit van de zure morel (*Prunus cerasus*). (Report on investigations on the influence of manuring, particularly with potash, on the quality of the fruit of the morello cherry.)

Reprinted from *Versl. Inst. Onderz. Verw. Fruit Groenten, Wageningen*, 1942, 1943, pp. 19-25.

The central potash trial field at Hedel (Gld.) is divided into 3 strips which have had the same manuring with regard to nitrogen and phosphorus but different applications of potash, i.e. A, for 16 years 1,500 kg. commercial potash per hectare; B, for 14 years no potash then for 2 years 1,500 kg. potash per ha.; C, for 14 years 750 kg. potash then for 2 years no potash. The fruit was examined in 1942 with these results: A showed the darkest fruit, the highest sugar content and the largest fruit. The fruit of B and C was far behind that of A in colour and other factors affecting the quality; the lowest sugar: acid ratio was in the fruit of B.

84. WANDER, I. W., AND GOURLEY, J. H. 631.83: 634.1/2

Increasing available potassium to greater depths in an orchard soil by adding potash fertilizer on mulch.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 21-4, bibl. 5.

Observations at Wooster, Ohio, show that the fixation of potassium at or near the surface of the soil when applied as a fertilizer can be eliminated by the use of a heavy mulch of straw, hay or similar plant material to which the fertilizer is added.

85. JUDKINS, W. P., AND WANDER, I. W. 634.25
The effect of cultivation, sod, and sod plus straw mulch on the growth and yield of peach trees.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 183-6, bibl. 7.

Briefly, results for conditions prevailing at Wooster, Ohio, indicated that: (1) yield of peaches is proportional to the size of the trees as indicated by trunk girth, (2) growth and yield were not proportional to soil organic matter or soil moisture, (3) the chief factor limiting growth in sod plots appeared to be lack of available nitrogen, (4) the different cultural treatments over the first ten years of the trial, i.e. up to the end of 1944, had no significant effect on blooming or ripening dates, quality or colour of fruit, leaf size or susceptibility to winter injury of wood or buds.

86. HARLEY, C. P., AND LINDNER, R. C. 631.67: 634.11 + 634.13
Observed responses of apple and pear trees to some irrigation waters of north central Washington.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 35-44.

This report deals with observed responses of apples and pears irrigated over a period of years with water containing relatively low amounts of Na and Cl ions in relation to the amount of Ca, $MgSO_4$, and HCO_3 ions. The conditions under which different orchards are discussed. Chlorosis in varying degrees was always associated with carbonate in the soil. Apples and pears tended to show a marked decline in vigour when irrigated for a number of years from wells, springs or creeks containing bicarbonates in concentrations of 200 p.p.m. or more. Annual plants and leguminous cover crops appeared to thrive in all the orchards under observation. Chlorosis was the most obvious disorder in the pears and no varietal differences could be observed. In apples chlorosis was sporadic and only rarely severe. There was, however, a characteristic decline in vigour in all apple varieties observed except Golden Delicious, which does apparently possess a specific tolerance to alkaline conditions.

87. HENDRICKSON, A. H., AND VEHMEYER, F. J. 631.67: 634.22

Some effects of irrigation on the interrelations of growth, yields and drying ratios of French prunes.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 187-90, bibl. 2.

Unirrigated French prune trees over a period of 12 years tended to set smaller crops per unit of cross-section area of trunks or of annual increment and to have slightly lower drying ratios than trees supplied with some water.—Davis, California.

88. BOWMAN, F. T., AND DAVISON, J. R. 634.22-1.67
Prunes under irrigation. Further results of investigations at Yenda.
Agric. Gaz. N.S.W., 1945, 56: 359-61, 387, 388, 400.

Continuation of investigations previously noted (see H.A. 12: 404) has confirmed the beneficial effects of the methods recommended. The present report consists of two articles: the first describing pruning methods which have increased yields, and the second summarizing further experience with irrigation and soil management. Pruning recommendations are based on the need to shift fruit production from the old enfeebled, over-multiplied spur systems to new wood. Details are given of the pruning during the first and subsequent years. Illustrations show trees before and after pruning, and close-up views of a branch unpruned and pruned, with detail of pruning. With regard to irrigation methods, early spring watering, coupled with good irrigation practice during the rest of the season has had the effect, in the experimental blocks, of altering the time of blossoming so that the blossoming period of the Robe variety has been advanced to coincide with that of d'Agen, thus greatly improving cross-pollination facilities. The irrigation practice to be adopted during the remainder of the year consists in keeping sufficient water up to the trees. The need for water can only be determined by an inspection of the soil using a soil auger. A system of soil management is required, which not only maintains or improves fertility and physical condition, but one which fits in with the practical details of irrigation, manuring and other cultural aspects of growing the crop. Burr clover can be recommended as an ideal cover crop for prunes. The soil management practice connected with its use are set out in detail.

89. MCGILLIVRAY, K. D. 634.1/7-1.67
Water storage as a means of stabilising fruit-growing in non-irrigated areas.
Agric. Gaz. N.S.W., 1945, 56: 343-6.

Many of the fruitgrowing settlements in New South Wales

are not in arid areas requiring full-scale irrigation but are subject to fairly regular occurrence of periods of low rainfall which could be relieved by conserved water as a supplement to the rainfall. Methods of storing water are described with special reference to earth dams and excavated tanks. The essential feature of earth dams are discussed under water-tightness and weight, protection from overtopping, and protection of surfaces from erosion.

90. MCGILLIVRAY, K. D. 631.459: 634.11+634.13
Methods of soil protection and fertility maintenance in apple and pear orchards in the higher rainfall areas of the southern and central tablelands.
Agric. Gaz. N.S.W., 1945, 56: 443-6, 495-7.

There is evidence that the soils in many orchards in New South Wales are becoming depleted of essential elements. Suggestions are put forward for raising the level of soil fertility cheaply. Many of the fruit-growing slopes could be cultivated with reasonable safety, and soil fertility maintained if a heavy leguminous winter cover crop were grown, protecting the soil while in growth and checking erosion by the large amounts of fibrous matter in the soil after being turned in. Subterranean clover [*Trifolium subterraneum*] flourishes in the higher rainfall apple and pear districts, when regularly top-dressed with superphosphate, under almost any soil conditions. The importance of using superphosphate with subterranean clover is stressed. A sowing rate of 8 lb. of the clover and 1 to 2 cwt. superphosphate per acre is recommended. It is sometimes not easy to get subterranean clover started on bare eroded patches in an orchard, but in such cases light dressing of farmyard manure has been used successfully. In some localities, it has been found advisable to add the particular root nodule bacteria required to the seed.

91. BATJER, L. P., MOON, H. H., AND KINMAN, C. F. 634.11-2.95
Apple thinning with caustic sprays applied during the blossom period.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 94-101, bibl. 5.

The results from the use of several dinitro-cresol compounds including Elgetol differed considerably in 1943 and 1944. The reasons for this are discussed. Foliage injury was not a serious factor.

92. HOFFMAN, M. B., AND VAN DOREN, A. 634.25-2.95
Some results in thinning peaches with a blossom removal spray.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 173-7, bibl. 2.

There are indications in these Cornell trials that early bloom thinning by means of sprays is conducive to better tree growth and crop the following year. But in areas subject to late frosts blossom thinning is more risky.

93. PEARSE, H. L. 634.1/7-1.55: 577.15.04
Hormone sprays and the pre-harvest drop of fruit.
Fmg S. Afr., 1945, 20: 747-52, 774, bibl. 28.

A review of the literature shows that the success of a pre-harvest hormone treatment in apples and pears varies largely with variety and with local and seasonal conditions. This was borne out again by trials with α -naphthaleneacetic acid sprays (0.001% and a commercial preparation) on Jon Chretien and Beurre Hardy pear trees, carried out on the University farm "Weigevallen" near Stellenbosch. The farm is exposed to strong south-easterly winds and it was found that they are the determining factor for the success of any treatment. In their absence fruit drop was reduced in some instances from 79% to 2%, while no sprays were used when they were blowing. The lesson to be learned by South African farmers from this paper is that they should explore the conditions on their farms by small-scale trials before committing themselves.

94. DAVIDSON, J. R. 634.25: 577.15.04
The use of hormone sprays to reduce the drop of Pullar Cling peaches. Promising results at Yenda.
Agric. Gaz. N.S.W., 1945, 56: 493-4.

The results obtained from the application of hormone sprays to pome fruits to check pre-harvest drop suggested the possibility of some similar control of the Pullar clingstone peach which has always had a habit of shedding much of its crop just prior to harvesting. That some advantage can be anticipated with this peach is evident from results obtained. Three proprietary hormone sprays were used and the saving of fruit through spraying was at the rate of 45 bushels per acre, or a ton of canning quality fruit, for it is usually the biggest and best fruit that falls.

95. VAN STUIVENBERG, J. H. M. 634.1/2: 577.15.04
Het behandel van vruchtboomen met groei-stoffen met het doel parthenocarpie te induceeren en den laten val te beïnvloeden. (Spraying fruit trees with growth substances in order to induce parthenocarp and influence late drop.)
Meded. Lab. Tuinbouwpl., Wageningen, 35, 1941, 79 pp., reprinted from *Fruiteelt*, 1940, Jrg. 30, Nos. 20, 22-24, and 1941, Jrg. 31, Nos. 2 and 3.

Trials with growth substances with the object of inducing parthenocarp in fruit trees have not yet been very successful. There were indications that spraying with growth substance on uncastrated flowers of the pear Précoce de Trévoux yielded a greater percentage of parthenocarpic fruits, as also the use of lanoline paste with growth substances, placed on the cut-back styles. The proportion of fruits set from such treatment was greater than in the rest. Spraying with naphthaleneacetic acid prevented to a large extent the late drop of certain varieties of apples. The addition of a spreader appears to be unnecessary. The concentration at present to be recommended is 10 p.p.m., one application being sufficient. The reduction of late drop occurs very soon, i.e. 2-3 days or even less after spraying, and the effect lasts for about 14 days. The best time for spraying is 14-18 days before the estimated time of ripeness for picking. The varieties Gronsvelder Klumpke, Ribstone Pippin, Calville Lesans, Framboos and Yellow Transparent react strongly to the treatment. The variety Laxton's Superb reacts up to the time of the picking ripeness stage. While Golden Reinette in one experiment at first showed a diminished drop, later the difference between sprayed and unsprayed trees disappeared completely. The variety Jonathan appears not to react. Hence for the last three varieties spraying is not recommended. Certain pear varieties react to the treatment, particularly Comtesse de Paris and St. Rémy. Conference showed no real difference in drop as between sprayed and unsprayed trees. It is concluded that the spraying of those varieties which respond to the treatment is highly profitable.

96. VAN STUIVENBERG, J. H. M. 577.15.04: 664.85.037

De invloed van groeistoffen op de rijping en op de houdbaarheid van vruchten bij bewaring in het koelhuis. (The influence of growth substances on the ripening and keeping of fruit during cold storage.)

Meded. Inst. Onderz. Verw. Fruit Groenten Wageningen, rks. 1, No. 8, 1942, 32 pp., bibl. 184.

Naphthaleneacetic acid at a concentration of 10 mg./l., when sprayed on trees of the apple variety Yellow Transparent to prevent pre-harvest fruit drop, was found to accelerate ripening, an effect not noticed in the varieties Starapple and Belle de Boskoop. The Starapples were placed in cold storage and, when analysed in February, there was no significant difference in total sugars after inversion between the fruits sprayed with naphthaleneacetic

acid at 5, 7.5 and 10 mg. and those unsprayed. Starapples picked at two different dates and treated with different concentrations of the growth substance were examined in the middle of March; those treated with 10 mg./l. were (from their appearance) not riper, those with 50 and 100 mg./l. somewhat riper, and those with 140-200 mg./l. obviously riper than those not treated at all. Experiments with Beurré de Mérode pears, which had been picked at three different times and afterwards treated with naphthalene-acetic acid at 50 and 200 mg./l. and then stored, some at about 20° C., the others at 1° C., showed that the growth substance in this high concentration may result in pronounced acceleration of the ripening process. In a large storage experiment with Starapples, which had been sprayed on the tree with naphthaleneacetic acid at 5, 7.5 and 10 mg./l. and then cold-stored until February, no differences could be observed in the percentage of sound fruits of the unsprayed and the sprayed lots, or with regard to rot and lenticel spots. In the Starapple and Lemoen varieties there was a slight indication that the sprayed fruits showed a greater tendency to stalk-rot than the unsprayed.

97. MARTH, P. C., BATJER, L. P., AND MOON, H. H. 634.11: 577.15.04

Relative effectiveness of sprays, dusts and aerosols of naphthaleneacetic acid on harvest drop of apples.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 109-12, bibl. 4.

In trials in West Virginia naphthaleneacetic acid was at least as effective in dust as in spray form and was successful in checking fruit drop. The aerosol method of application was the most successful of all the treatments. Approximately 1½ lb. of the aerosol, containing the equivalent amount of naphthaleneacetic acid in 15 gallons of .001% spray, was used per tree.

98. BATJER, L. P., AND MOON, H. H. 577.15.04: 634.11

Effect of naphthaleneacetic acid spray on maturity of apples.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 113-7, bibl. 2.

Virginian experiments indicate that although no direct effect can be expected from the use of naphthaleneacetic acid on firmness of fruit and general keeping quality of autumn and late autumn apples, a direct stimulating effect can be expected on some of the softer summer apples.

Noted.

99. a. DEGMAN, E. S. 634.13-1.84
Increased fruit set of Anjou pear with heavy application of nitrogen.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 25-6, bibl. 2.

Trial at Medford, Oregon.

- b. EINSET, J. 634.11
The spontaneous origin of polyploid apples.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 91-3, bibl. 5.

- c. GERHARDT, F., ENGLISH, H., AND SMITH, E. 634.23 + 664.85.23

Cracking and decay of Bing cherries as related to the presence of moisture on the surface of the fruit.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 191-8, bibl. 3.

Paper also includes notes on hydrocooling.—Wenatchee, Washington.

- d. MEURMAN, O. 634.1/7(471.1)
Suomen hedelmäpuuvakiolaajikkeet. (Fruit tree varieties in Finland.)

Valt. Maatalousk. Tiedon., 1941, No. 180, pp. 29.

SMALL FRUITS, VINES AND NUTS.

100. TURNBULL, J. 634.723
Black currants.

Agriculture, Lond., 1945, 52: 362-5.

The most serious difficulty to contend with in black currant growing is the virus disease known as reversion, which can be kept under control by planting bushes certified by the Ministry of Agriculture and by examining every bush once a year, about the middle of June. The planting distance suggested is 9 feet for most varieties and 7½ feet for weak growers. Mulching in winter—ten loads of straw manure or compost per acre on medium soils or twenty loads on sandy soils—is strongly recommended to satisfy the requirement of an abundant moisture supply. In view of the damage done to the surface feeding roots cultivation should be kept to a minimum. The same rule applies to pruning. A dressing of fertilizers, especially a generous application of sulphate of ammonia on soils well provided with lime, is beneficial. Nine of the most popular varieties are briefly characterized.

101. ŽITNEV, P. I. 634.723-1.521
The results of black currant varietal studies.

[Russian]

Proc. Sci. Conf. Timirjazev Agric. Acad. 3-10 June, 1944, 1945, No. 1, pp. 49-51.

In the search for improved black currant varieties, particular attention has been paid to habits of growth which distinguish one variety from another, in order to evolve a system of pruning and general management suitable for each. Observations have covered arrangement, order of formation, degree of vigour, etc., of buds and branches; yield and quality of fruit; and hardiness and immunity from disease.

102. KRONENBERG, H. G. 634.75-1.521
Het selecteren van aardbeien. (The selection of strawberries.)

Reprint Meded. Insp. Tuinb., August, 1943, 6 pp.

The author puts the question, "Why is selection necessary?" and answers it under three headings. I. To preserve the purity of the variety. II. Selection for freedom from diseases and pests; the chief diseases, particularly the virus diseases (yellow edge, crinkle, witches' broom), and pest (eelworm and mites) are briefly described. III. The possible appearance of mutations. Under the last heading are included a leaf variegation in the variety Madame Moutón the "June yellows" of America, and the mutation of bisexual varieties into genetically pure female plants. Degeneration in the strawberry can be said to be 99% due to diseases, and selection in this crop mostly means selection for freedom from diseases.

103. SELS, L. 634.75
President Roosevelt : Hanekam : Royal Sovereign.

Cultuur Hand., 1941, 9: 339-40.

As these three varieties of strawberry are sometimes confused, the author describes their chief characters as an aid to distinguishing them.

104. VAN ORSHAEGEN, A. 634.75
De openluchtteelt van aardbeien in verband met de opbrengst. (Out-door cultivation of strawberries in relation to crop.)

Cultuur Hand., 1945, 11: 102-3, 128-9.

A general account of the methods to be employed in order to get the best crop results. Emphasis is given to correct manuring. The optimum reaction of the soil for strawberries is pH 6.6-5, and this should be borne in mind when

choosing fertilizers. The grower is advised to have his soil analysed before deciding on his manuring formula.

105. VAN ORSHAEGAN. 634.75:1.544
De aardbeienteelt onder koud glas. (Strawberry culture in cold frames.)
Cultuur Hand., 1945, 11: 199-202.

This article describes the method of forcing strawberries by growing in frames or cool greenhouses. Many varieties are suitable for this purpose; the writer recommends: early varieties—Deutsch Evern, Madame Lefèvre, Laxton Noble, Professeur Burvenich; mid-season—Princess Clémentine; late—Président Roosevelt, Tardive de Leopold. Notes are given on suitable manuring. The treatment of plants in frames is given in some detail, with emphasis on ventilation, shading and hand-pollination.

106. RODENBURG, J. W. M. 634.75:581.035:631.588.2
Het vervroegen van aardbeien met kunstlicht.
(The forcing of strawberries with artificial light.)
Landbouwk. Tijdschr., 1939, 51: 896-932.

Forcing strawberries, if postponed until November, does not give satisfactory results, and artificial illumination at this time of the year is not very successful, even when the plants have been exposed previously to low temperatures. Previous cooling made possible a better crop, but the yield, in practice, was insufficient. By using Neon lights it was established in the early experiments that earliness and increase of yield could be obtained with a moderately strong illumination (ca. 500 H. Lux.). The period of illumination was more important than the intensity. With 8 hours per night a good yield was obtained, 4 hours being too little. Full development of the plants is dependent on the date when artificial illumination is started. Already by the middle of October the decreased daylight has influenced the plants and successful forcing becomes difficult. An intense illumination with Neon light from the beginning of October provided a good crop in February. Weak illumination from October to the middle of November followed by intense Neon lighting gave a crop only two-thirds of that obtained by Neon light during the whole period.

107. VAN DEN MUIJZENBERG, E. W. B. 634.75:581.035/036
De invloed van licht en temperatuur op de periodieke ontwikkeling van de aardbei (*Fragaria grandiflora* Ehrh.) en de betekenis daarvan voor de teelt. (The influence of light and temperature on the periodic development of the strawberry and its significance in cultivation.)
Meded. Lab. Tuinbpl. Wageningen 37, 1942, 160 pp., 21 figs. from photographs, bibl. 184.

The object of the present work was to study the action of temperature and light on strawberry plants so that by artificially controlling these factors, particularly in autumn and winter, it might be possible to produce strawberries all the year round. From the literature and from his own investigations the author first describes the typical development of the strawberry plant with special reference to the variety Deutsch Evern. The runners are first noticeable in May and in about 3½ weeks the first fully grown leaf has developed; about this time the first roots of the runner emerge. The runners continue to be formed throughout the summer till October. The flowers begin to be laid down with the diminished daylight during the second half of August, and the flower primordia become noticeable in September. In the development of the plant three phases are recognized: the *preflorigene* (before the flowers are laid down), the *florigene* (flowering period), and the *postflorigene* (post-flowering period) in winter. During the autumn, although external conditions are not unfavourable, there is a period of very slow development, and this is followed by the winter "rest period" when there is no visible growth. It is probable that, when forcing the plants in winter, the

quantity and the onset of the blossoming period are limiting factors in runner production; in the open ground the low temperature is an inhibiting factor and so also is drought. The leaves during this period show little development and remain short, and their length increases with the longer periods of daylight. In blossoming, two phases are to be distinguished: *induction of flower development* when the growing point is in a condition that the inflorescence can be initiated, and the *actual flower development* when the flower primordia are formed. The induction of flower development is dependent on length of day, provided that the plants are in the florigene condition, i.e. about the middle of May. The plants can be subjected to short day treatment; in the Deutsch Evern variety it is immaterial whether this short day is of 6, 8, 10, or 12 hours long, but with a 14-hour day the plants come into bloom later. This treatment must last at least 6 days and mostly lasts about 2 weeks, by which time the induction period is ended. Between the beginning of induction and the beginning of flowering is a period of 6-8 weeks. With a temperature of 10° to 15° C. the induction of flower development is possible in a rather long day period; this would not be the case with a higher temperature. From the data obtained, the author draws up schemes for the treatment of strawberry plants, by reducing or increasing (electrically) the lighting and by applying heat when necessary, modified according to the time of year when the crop is required.

108. DERMEN, H. 634.76:547.944.6
The mechanism of colchicine-induced cytological changes in cranberry.
Amer. J. Bot., 1945, 32: 387-394, bibl. 14.

When cranberry plants are treated with colchicine to induce polyploidy, the results are mostly chimeric polyploids of sectorial and periclinal type. Polyploidy resulting from colchicine treatment may be classified into two types: apical and axial. The former results from colchicine effect in central cells of any of the histogenic layers at the apical dome; the latter denotes polyploidy in other than central cells. It is suggested that in woody plants, if the treatment of a bud results in polyploidy, axial polyploidy will be found in the shoot of the first year's growth, whereas apical polyploidy will be found in the growth of the second or third year unless the treated bud is forced during the first year to make the equivalent of two or more years of growth. [From author's summary.]

109. WEIDENHOEFER, K. 634.8
Some reasons for an increased planting of wine grapes on River Murray areas.
J. Dep. Agric. S. Aust., 1945, 48: 479-81.

The significance of the irrigated River Murray areas for Australian wine production is borne out by their share of about 25% of the total Commonwealth wine exports in 1939. In his paper read before the River Murray Conference in May 1945, the author takes a very optimistic view of future developments and pleads for an expansion of vine growing in the district.

110. MEIER, K. 634.8:519
Bericht über die Ergebnisse des Versuchsweingebirges in Jenins, Kt. Graubünden, für die Jahre 1930 bis 1939. (Results obtained during the period 1930-1939 in the experimental vineyard at Jenins, Switzerland.) [French summary ½ p.]
Landw. Jb. Schweiz., 1945, 59: 727-55.

A statistically planned viticultural experiment for the study of various factors—a novelty in experimental technique in Switzerland—was inaugurated on a vineyard at Jenins in the Bündner Herrschaft in 1930 and carried out by the Wädenswil Research Station. During the first 10 years the following results were obtained: (1) Provided four replications are made and the problems to be studied are not complex, a plot size of 50 m² should provide a sufficient quantity of grapes and wine. (2) A comparison of 3 rootstocks showed that

Riparia × *Rupestris* 3309 is best suited to the Jenin soil, which is rich in lime, stony and comparatively dry. The pruning of vines on this rather vigorous rootstock should, within limits, aim at reducing yield and increasing foliage area so as to improve quality. (3) Better quality wine was produced from vines trained on stakes than from those trained on wire. The data presented are numerous and suggestions are made for the continuation of the trial.

111. MENDES DA COSTA E SOUSA, L. DE O. 634.8
Alguns aspectos do melhoramento em viticultura.
(Some aspects of improvement in viticulture.)
An. Inst. sup. Agron., Lisboa, 1941, 12: 181-204.

Viticulture in Portugal has had its periods of prosperity and decadence, the latter being of longer duration. As a step towards an improvement on present conditions the author discusses the rootstock problem in grape vines. He quotes freely from results obtained in other countries and refers to trials carried out in Portugal, pointing out that it is important to carry out trials under the conditions obtaining in that country and not to rely solely on results obtained abroad. He treats grafting under these heads:—compatibility, effect on cropping, precocity, vigour and longevity.

112. WELLINGTON, R. 634.8
Promising grape varieties.
Amer. Fruitgr., 1945, 65: 9: 10, 11, 30, 31.

At Geneva and Eredonia, New York, about 40,000 grape seedlings have been planted, and some 30,000 have fruited; thirty have been named but at least ten of these have been dropped for various reasons. The most promising are here described, eight of them illustrated from photographs.

113. HUBER, H. 634.8-1.541.11
Gründungsversammlung der Genossenschaft zur
Produktion von amerikanischem Unterlagengholz.
(An association founded in Switzerland for the
propagation of American vines.)
Schweiz. Z. Obst- u. Weinb., 1945, 54: 242-3.

An association for the propagation of clones of American vines for rootstock purposes has been founded to make Switzerland more independent of imports. Initial steps have been the planting up in a so-called mother garden of 3,050 rooted vines raised at Wädenswil.

114. LEAK, F. 634.8-1.874
Experiences with lucerne growing between vine
rows.
J. Dep. Agric. S. Aust., 1945, 48: 548-9.

A viticulturist reports that in his vineyard lucerne grown between the rows was a great success. The cover crop took up the surplus water without interfering with the vines and steadied the flow of water down the row, thus stopping erosion. Different methods of irrigation on different soil types are briefly described.

115. BOYNTON, D. 634.8-2.19: 631.83
Potassium deficiency in a New York grape vineyard.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46:
246-8, bibl. 5.

Thought at first from symptoms to be boron deficiency, the interveinal chlorosis and marginal veining of vine leaves were later found to be due to potassium deficiency.

116. HEWITT, W. B., AND JACOB, H. E. 634.8-2.19
Effect of zinc on yield and cluster weight of
muscat grapes.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46:
256-62, bibl. 6.

Observations in Fresno and Tulare Counties, California, indicate that coulure and the formation of shot berries in the muscat is a complex problem not solely related to zinc.

117. JONCKHEERE, W. 634.8-1.544
Winterwerk in de druivenserren. (Winter work
in vinehouses.)
Cultuur Hand., 1940, 8: 181-3.

Hints on the winter treatment of vines in cool houses with

special reference to pruning (3 figs.). Five formulae for compounding fertilizers suitable for vines are given.

118. WINKLER, A. J., AND WILLIAMS, W. O. 634.8: 581.192

Starch and sugars of *Vitis vinifera*.

Plant Physiol., 1945, 20: 412-29, bibl. 36.

The winter disappearance of starch in *vinifera* grapevines is almost quantitatively accounted for by the appearance of an equivalent amount of sugar in the above-ground sections. There is no evidence of dormant-season carbohydrate translocation, nor of the hydrolysis of hemicellulosic materials other than starch and sugars. There is no evident winter conversion of starch to sugar in the roots. The decreases in carbohydrates during the dormant season indicate a respiratory loss of about 0.5% per month in the wood of the stems. Extremely high starch storage occurs in the bark sections of the roots and in the rootlets. In the shoot wood there is an indication of a gradient of fall starch storage toward the apex and toward the base from a mid-point supply centre. The starch and sucrose in the succulent green tissues are of relatively minor importance as compared with the reducing-sugar content. [From authors' summary.]

119. SNYDER, E., AND HARMAN, F. N. 634.873
Temperature and maturity in relation to raisin
production.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46:
249-52, bibl. 2.

This report gives a summary of temperatures during fruit development and the results of drying the following *vinifera* varieties at different sugar percentages, and compares the resulting raisins, namely Zante currant, Black Monukka, Sultanina, Feher Szagos, Muscat of Alexandria and Malaga.

120. VANDERWAEREN, R. 634.51
De notboom. (The walnut.)
Cultuur Hand., 1941, 9: 334-8, 365-9.

An account of the walnut and its cultivation under the following main headings: Climate, soil, importance of its cultivation abroad (France, U.S.A., Germany, England) and in Belgium, trade in walnuts, Belgian imports and exports, the economic value of the walnut (the nuts, the wood), choice of varieties (the chief varieties are described and their nuts figured), planting, manuring, treatment after planting (pruning, thinning), care of the mature trees, crop (yield, storage).

121. KOBEL, F. 634.51
Eine Walnuss mit roter Samenhaut. (A walnut
with a red seed coat.)
Schweiz. Z. Obst- u. Weinb., 1946, 55: 22-3.

A walnut tree bearing nuts with a red seed coat is now being propagated at Wädenswil for further study. Since only one of the trees arising from a number of nuts with red seed coats, planted by a Swiss farmer about 20 years ago, shows the parental character, it probably originated as a result of self-pollination. The nut is of good quality and sweet and its possible attraction for the confectionery trade is mentioned.

122. SLATE, G. L. 634.51
Japanese walnut and the heartnut.
Amer. Fruitgr., 1945, 65: 1: 28.

Brief descriptions are given of the Japanese walnut [*Juglans sieboldiana*], the heartnut [*J. cordiformis*], and the Manchurian walnut [*J. mandshurica*], the last closely resembling the American butternut [*J. cinerea*]. These three types are said to hybridize with each other and with the butternut; the hybrids grow very rapidly and make handsome shade trees, but they are rather unfruitful even though they bloom heavily.

123. BLAKE, M. A., AND EDGERTON, L. J. 634.53
Experiences with blight-resistant chestnuts in
New Jersey.
Bull. N.J. agric. Exp. Stat. 717, 1945, pp. 20,
bibl. 7.

After the native American chestnut, *Castanea dentata*, had

almost been annihilated by blight in the eastern forests during the first two decades of this century, attempts were made to establish blight-resistant species. In New Jersey, interest centred round the Chinese chestnut, *C. mollissima*, whose nuts are nearly as sweet as those of the American chestnut and as large as the European. In spring 1926, the first batch of about 150 trees was planted in a test orchard, further lots being planted later. It was found that the Chinese chestnut, which is a slow grower, succeeds best on a comparatively well-limed, fertile soil, with a pH of not less than 6. While some trees showed blight infection after 5-6 years in the narrow crotches near the ground, none with single straight trunks developed the disease. The tree form is therefore regarded as more desirable than the bush. A detailed study of the variability in productiveness, growth status and size and quality of nuts has been made, but as yet only a few selections are available. Observations indicate that the chestnut is as sensitive to length of season and temperature as for instance apples and peaches, and that it will be necessary to select varieties for different climates. Apparently, Chinese chestnut seedlings are the best rootstocks upon which to propagate selections of this species. Two methods of growing rootstocks from nuts are described. Chinese chestnuts cannot be grafted so readily as the apple. Of the grafting methods tested the ordinary splice graft has been found most successful. Stock (2 years old) and scion must be of about the same size, and well matured scion wood should be used. A modification of the splice graft as used in propagating chestnuts in China is pictured. Two- to three-year-old trees, 2-3 feet high, are a good size to transplant, a planting distance of not less than 25 x 25 feet being desirable on a fertile, deep loam soil. In order to thrive the crop requires as much cultural care as apples. In view of the extensive work on chestnuts carried out by the U.S. Department of Agriculture a comparatively rapid improvement in varieties may be expected. The Japanese beetle is the only serious insect pest attacking the crop in New Brunswick.

124. GUSEV, P. P. 634.53-1.56
The utilisation of fallen chestnut leaves as raw material for the manufacture of tannin. [Russian.] *Vest. Soc. Rast.* (Soviet Plant Industry Record), 1941, No. 1, pp. 188-91.

The wood, bark, leaves, spiny jackets of the fruit, and the inflorescences of the Spanish chestnut all yield tannin. The last three deteriorate if left outside too long. Analysis showed that 1,500 kg. of leaves and 300 to 500 kg. of the spiny jackets yielded about 350 kg. of dry tanning extract of high quality. During dry weather in autumn the leaves and other droppings off the trees must be gathered into heaps for drying, then baled for delivery to the factory. Other uses of *Castanea sativa* Mill. are: flour and substitutes for coffee and chocolate from the fruit; dyes, cellulose, and alcohol from the wood. All parts of the tree are useful. There is a passing reference to the grafting of *C. sativa* on *Quercus sessiliflora* and *Q. robur*. The growth of the chestnut was very vigorous, and unusually large leaves were formed, the content of tannin in which, however, was somewhat reduced.

125. M., H. A. 634.54
Cultivation of cobnuts. *Gdnrs' Chron.*, 1945, 118: 190-1.

Most of the cobnut and filbert plantations in Britain occur in Kent, mainly in the lower greensand area around Maidstone. Propagation by layering is described and the practice followed in manuring and spraying is noted.

126. a ENGARD, C. J. 634.71: 581.14: 632.5
Habit of growth of *Rubus rosaefolius* Smith in Hawaii. *Amer. J. Bot.*, 1945, 32: 536-8, bibl. 10.
b WILSON, A. N., AND OTHERS. 634.75
The Evermore strawberry. *Minn. Hort.*, 1945, 73: 19-20.

PLANT PROTECTION OF DECIDUOUS FRUITS.

127. BEESON, K. C. 632.19: 631.811.9
The occurrence of mineral nutritional diseases of plants and animals in the United States. *Soil Sci.*, 1945, 60: 9-13.

Area patterns for the occurrence of nutritional troubles with respect to specific plant species and believed to be caused by deficiencies of boron, manganese, zinc, copper, or iron are presented for the United States. Maps show the distribution of mineral nutritional diseases in plants and animals.

128. HAAS, A. R. C. 546.27: 634.55 + 634.63 + 634.51
Boron content in almond, olive and walnut trees. *Proc. Amer. Soc. hort. Sci. for 1945*, 1945, 46: 69-77.

Boron deficiency symptoms in almond, olive and walnut and notes on the boron found in these plants are discussed. Riverside, California.

129. LÖHNIS, M. P. 632.19: 546.27
Histology of boron deficiency in plants. *Meded. LandbHoogesch. Wageningen*, 1940, dl. 44, verh. 3, pp. 36, bibl. 23.

A microscopical study has been made of deficiency symptoms in the anthers of wheat, oats, rye and barley, grown in a medium deprived of boron, and of sound and diseased roots of swede turnips. The etiology of boron starvation is discussed and it is suggested that boron is a constituent of a substance synthesized in the leaves.

130. BENNETT, J. P. 632.191: 546.72
Iron in leaves. *Soil Sci.*, 1945, 60: 91-105, bibl. 12.

The role of iron in plants is discussed with special reference to chlorosis, the most common cause of which is an excess of lime in the soil. The inactivation of iron has been

ascribed by different workers to excess of phosphorus, of potassium, and of manganese; data are presented with comments. The article also reviews work on sampling and calculation, iron and chlorophyll in pear leaves, active and residual iron, nitrogen and chlorophyll.

131. KEMP, H. K., AND BEARE, J. A. 634.1/7-2.191
Lime-induced chlorosis of fruit trees. A progress report on experimental work. *J. Dep. Agric. S. Aust.*, 1945, 48: 526-9.

Lime-induced chlorosis of fruit trees occurs in many parts of South Australia in the lower rainfall areas. For a number of years several means of applying iron salts to affected trees of different fruit kinds have been tried, but so far a rapid temporary correction of chlorosis, at least for one season, was obtained only by the crowbar hole method of application. One-half pound of sulphate of iron is placed in the bottom of each of 8 holes, 18-24 in. deep, around the tree, about 6 ft. from the butt. Further investigations as to the timing of the treatment seem necessary; results up to the present show that, to avoid injury, applications should be made shortly before bud burst. In at least one instance a gradual permanent improvement was achieved by using a check bank system of irrigation to induce heavy leaching. Under very unfavourable conditions re-soiling of the area is possibly the only means of effecting a permanent cure.

132. BOYNTON, D. 634.11-2.19: 631.811.6
Studies on control of magnesium deficiency in New York apple orchards. *Proc. Amer. Soc. hort. Sci. for 1945*, 1945, 46: 1-5, bibl. 4.

This work done in 1943 and 1944 gives indications rather

than results of immediate practical application. Treatments given included (1) digging in of dolomitic limestone (25% MgO), (2) with the addition in some cases of Epsom salts, (3) spraying with Epsom salts, and (4) with high magnesium hydrated lime. While the addition of the limestone increased leaf magnesium percentages slightly with partial control of blotch in the first year in one group of trees and showed a further increase in magnesium content and blotch control in the second year, the control trees in the second year also—as a result of very dry weather—showed less blotch than in the previous year. The addition of Epsom salts gave no measurable benefit. No conclusions could be reached, owing to lack of data on recovery from blotch, on the control of deficiency by treatments (3) and (4). Leaf analyses indicated, however, that two cover sprays including 16 lb. of high magnesium spray lime per 100 gallons in regular summer cover sprays were as effective in increasing leaf magnesium as two sprays including 16 lb. Epsom salts.

133. SOUTHWICK, L., AND SMITH, C. T.

634.11-2.19: 631.811.6

Further data on correcting magnesium deficiency in apple orchards.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 6-12, bibl. 6.

Massachusetts trials indicate that for magnesium deficient trees the application of 20 lb. Epsom salts per 100 gal. spray solution in three early season applications in one year is valuable, especially for apple trees which are slow to respond to soil treatment. Soil applications of Epsom salts and kieserite were beneficial in young mulched blocks, but one application of dolomite, kieserite or Epsom salts was in general ineffective in a seriously deficient orchard under sod. Commercial magnesium oxide (92% MgO) applied thus appeared to result in greater increases of magnesium in apple leaves on young trees than did an equal weight of Epsom salts. Results with the oxide on older trees are not available. The application of commercial dolomite, even in relatively large quantities, unless accompanied by Epsom salts, was not very successful.

134. CHUCKA, J. A., WARING, J. H., AND WYMAN, O. L.

634.11-2.19: 631.811.6

Magnesium deficiency in Maine apple orchards.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 13-4.

Magnesium deficiency has markedly increased in recent years in Maine apple orchards. Early in August the older leaves of the current season's growth show chlorosis at the tips and outside margins and in areas between the veins. Later other leaves are affected and the chlorotic areas die and turn brown, hence the name "leaf scorch". In late August and early September the scorched leaves begin to drop and in severe cases trees may be almost completely defoliated by late September. Affected trees make little terminal growth and generally produce smaller fruit. In the McIntosh there would appear to be a rather close correlation between severity of magnesium deficiency and amount of premature apple drop. Trials to date—merely noted—indicate the desirability of treating orchards on soil known to be low in magnesium with dolomitic limestone as a preventive and when the trees show the deficiency symptoms with sprays containing 20 lb. Epsom salts per 100 gal. spray material.

135. VANSELOW, A. P.

634.51-2.19: 546.711

The minor element content of normal, manganese-deficient and manganese-treated English walnut trees [*Juglans regia*].

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 15-20, bibl. 6.

A table shows the minor element content of English walnut tree leaves determined spectrographically on untreated and treated manganese-deficient trees and from normal trees from two sources in California. It was found possible to cure the deficiency by spraying in early summer with 5 lb.

manganese sulphate per 100 gal. water or by injecting 16 or 18 g. dry manganese sulphate. Deficiency of manganese did not apparently affect the content of other minor elements in the leaves.

136. CROCKER, W.

631.811.7: 632.19

Sulphur deficiency in soils.

Soil Sci., 1945, 60: 149-155, bibl. 35.

Investigations on sulphur in its relation to plant nutrition is discussed under:—plants the source of sulphur for animals; errors in ash analysis; early responses to gypsum; sulphur balance sheets for soils; soils at present showing deficiency of sulphur as a crop nutrient; symptoms of sulphur deficiency and formative effects of sulphur. S-deficiency in the navel orange caused immature fruits to be yellow-green instead of deep green and mature fruits to be yellow instead of orange. The writer concludes that there is no doubt of the importance, in plant and animal economy, of sulphur as a synthate for proteins and a number of other essential or important organic compounds. Sulphur undoubtedly is needed in considerable quantities in a number of deficient soils in the United States and other countries, especially in regions distant from industrial and population centres where relatively little sulphur is furnished by the air. Any permanent fertilizer system that does not include the application of a sulphur-carrier is sure to result in sulphur-hungry crops in some rural regions.

137. MCWORTER, O. T.

634.2-2.19: 546.47

Zinc-coated nails check "Little-leaf".

Better Fruit, 1945, 39: 10: 11.

Zinc sprays, injections and tacks used in demonstrations for control of little-leaf effectively controlled the disorder on peaches, apricots and cherry trees when properly used before the trees were too far gone. Zinc sprays, zinc coated nails, or zinc tacks driven into affected trees proved to be the more practical treatments.

138. PARTRIDGE, N. L.

634.25-2.111

Freezes of the winter of 1942-43.

Quart. Bull. Mich. agric. Exp. Stat., 1944, 27: 54-9, bibl. 1.

The distribution of minimum temperatures in the lower peninsula of Michigan at different dates during the winter of 1942-43 is illustrated by 5 charts and their relation to trunk and bud injuries to peach trees is discussed.

139. BRIERLEY, W. G.

634.711-2.111

Why do hardy raspberries winter-kill?

Minn. Hort., 1945, 73: 119-21.

There is now evidence that much injury to raspberry canes may occur when temperatures vary from cold to warm and to cold again at almost any time from November to April. The factors involved are: (1) Cold weather breaks the rest. (2) A few days with air temperature above freezing may bring about the loss of hardness or resistance to cold. (3) If the temperature rises above 43° F. for a few days with little or no frost at night, buds may begin the very early stages of development and thus be neither dormant nor hardy. (4) Subsequent cold, particularly sudden cold, is likely to cause severe injury to canes that have lost their resistance to cold or to those that may actually have begun the early stages of bud development. A table shows the temperature conditions in the dormant season during seven winters (1937-44) and the extent of cane injury; after winters with no warm spells there was no evident damage, but after winters with varying cold and warm spells cane injury was widespread and generally severe.

140. BURRELL, A. B., AND BOYNTON, D.

634.11-2.111: 631.84

Effect of nitrogen level on freezing injury to growing blossom buds of the McIntosh apple.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 32-4, bibl. 4.

McIntosh apple trees planted in sod in 1925 in the Champlain Valley of New York received similar treatment until

1941 inclusive. From 1942 to 1945 the nitrogen treatment was varied. Observations on results of frost on two nights in April 1945 showed that the killing of buds was more extensive on high nitrogen trees, but that this difference was not evident when buds were selected at a retarded and similar stage of development.

141. OSTERWALDER, A. 632.1: 634.1/8
Von der sog. vorzeitigen Herbst-, speziell Rotfärbung der Blätter an Reben und Obstbäumen. (Premature red autumn colouring in vine and fruit tree leaves.)
Schweiz. Z. Obst- u. Weinb., 1946, 55: 3-9, 23-5.

Various theories on the cause of the red autumn colouring of leaves are discussed and reasons are given why the adaptation theory seems unsatisfactory. The author believes that the red colouring is the reaction of tannin-containing leaves to excessive losses by transpiration. Such losses will normally occur in autumn when the low soil temperature reduces the absorptive capacity of the root and gradual abscission blocks the conducting vessels of the leaf. Excessive water losses, however, may occur also earlier in the season and produce the same results prematurely. Among conditions conducive to premature red colouring of the leaf are mentioned: Unfavourable position of the leaf, very high temperatures, broken branches, fungus growth in the conducting vessels, canker, root injuries, etc.

142. ZELLER, S. M., AND MILBRATH, J. A. 634.25-2.8: 634.23
Transmission of peach wart to sweet cherry.
Phytopathology, 1945, 35: 607-9.

Peach wart found in Improved Elberta trees in western Oregon was transmitted to seven varieties of peach trees and the Black Republican, Lambert, and Napoleon (Royal Anne) sweet cherry trees. The symptoms in sweet cherry leaves and stems are described. Peach wart virus was also transmitted from the sweet cherry trees back to peach trees without apparent attenuation of the virus in cherry. [Authors' summary.]

143. SCHNEIDER, H. 634.25-2.8: 634.23
Anatomy of buckskin-diseased peach and cherry.
Phytopathology, 1945, 35: 610-35.

Necrosis of sieve tubes occurs in buckskin-diseased peach trees. Necrotic sieve tubes contain a substance, here called wound gum, the staining reactions of which are given. Usually necrosis was limited to the sieve tubes, but sometimes it also involved other cells. When certain strains of the buckskin virus or very susceptible peach varieties were used, cankers developed on the stems. The cankered areas contained gum pockets in the cortex and phloem. Peach scions on myrobalan rootstock often grow abnormally at first, but later exhibit yellow, rolled leaves with swollen veins and some premature defoliation. In infected cherry trees on mahaleb stock wound gum formation was very extensive even in midsummer in the summer phloem. Ultimately the youngest sieve tubes were affected in the mahaleb stock just below the bud unions. No injury to phloem has been observed in either diseased or healthy orchard trees on mazzard roots. Some wound gum was present in the outer phloem in infected young greenhouse trees on this stock. [From author's summary.]

144. LOTT, T. B. 634.23-2.8
"Lambert Mottle", a transmissible disease of sweet cherry.
Sci. Agric., 1945, 25: 776-9, being Contr. Dominion Science Serv. 824.

A new transmissible disease of sweet cherry, known only to produce symptoms on the Lambert variety, is described and the symptoms illustrated by 4 figures. Transmission experiments, by grafting dormant scions or by tissue grafting, gave positive results. Pronounced symptoms are produced by Lambert mottle on Lambert trees and by

mottle leaf on Bing and Napoleon trees, but there is little or no visible effect of Lambert mottle on Bing or Napoleon trees, or of mottle leaf on Lambert trees. When both diseases are present in a tree the symptoms depend on the variety of the tree and only one disease is visible, the other having no apparent effect.

145. KUNKEL, L. O. 634.76-2.8
Studies on cranberry false blossom.
Phytopathology, 1945, 35: 805-21.

Cranberry false-blossom virus was transmitted by dodder, *Cuscuta campestris*, from cranberry to 28 different species of plants belonging to 10 different families. It was transmitted by dodder from *Vinca rosea* and tomato to cranberry plants. It was retained by dodder growing on healthy plants over a period of two years, and it apparently multiplies in this vector. It was transmitted by grafting to *Vinca rosea*, Turkish tobacco, tomato, potato, *Nicotiana glutinosa* and *N. rustica*. It was not transmitted mechanically by means of juice, by the aster leafhopper, *Macrostelus divinus*, or through dodder seeds produced by the parasite while growing on a diseased tomato plant. In all the species to which it was taken, false blossom produced yellows type symptoms. In many it caused gigantism in flowering and fruiting organs; it caused sterility on tomato. False blossom in periwinkle and cranberry was cured by heat treatment. Treatments at 42° or 43° C. for about 8 days are recommended for cure of cranberry plants. It is suggested that false blossom may be closely related to big bud of tomato in Australia and the United States, to stolbur of tomato in the U.S.S.R., and to little leaf of eggplant in South India. [Author's summary.]

146. PEYER, E. 634.8-2.8
Droht unsern Reben ein noch viel schlimmerer Feind als die Reblaus? (Are our vines menaced by a disease more pernicious than *Phylloxera*?)
Schweiz. Z. Obst- u. Weinb., 1945, 54: 453-5.

This discussion of the pernicious virus disease of vines, court-noue, is based on two papers by Branas and M. Gros respectively (*Bull. Off. internat. du Vin*, 1945, Nos. 171-4), dealing with the enormous damage the virus has already caused in France. Affected vines show symptoms from all degrees of stunted growth to complete die-back and suffer especially from fruit drop. The disease is transmitted in the soil as well as from rootstock to scion and vice versa. Switzerland will have to meet the menace by importing rootstocks from certified nurseries only and by increasing her own production of clonal vines.

147. STAPP, C. 632.314
Der Pflanzenkrebs und sein Erreger *Pseudomonas tumefaciens*. XIII . . . (Crown gall and its causal organism *P. tumefaciens*. XIII. The significance of colchicine as a means of inducing polyploidy in the pathogen and its alleged value as a control measure of crown gall.)
Zbl. Bakt., Abt. II, 1944, 106: 338-50, bibl. 39.

A 2% aqueous solution of colchicine was shown to be unsuitable for controlling crown gall caused by *Pseudomonas tumefaciens*, at least in its later stages.—*Biol. Reichsanst., Berlin-Dahlem*.

148. KEENER, P. D. 581.144.4: 632.4
Mycoflora of buds.
Science, 1945, 102: 383-4, bibl. 1.

From the tissues of normal foliar buds of *Aesculus*, *Cedrela*, *Fraxinus*, *Ginkgo*, *Magnolia*, *Populus* and *Robinia* species, several species of fungi and bacteria and a few *Actinomyces* were isolated, most of the fungi belonging to the *Ascomycetes* and *Fungi imperfecti*. In at least two instances a distinct specificity of fungi for certain species of trees was shown to exist. At the time of the opening of the buds the microorganisms were most abundant, and the question is raised whether they may possibly have a physiological function in

bud and shoot development.—University of Pennsylvania, Philadelphia.

149. MARCUS, O. 576.85
Über das Vorkommen von Mikroorganismen in pflanzlichen Geweben (nach Untersuchungen an Früchten und Samen). (The occurrence of micro-organisms in the tissues of fruits and seeds.) *Arch. Mikrobiol.*, 1942, 13: 1-44, from abstract *Zbl. Bakt.*, Abt. II, 1944, 106: 376-7.

As a rule, micro-organisms were found to occur in fruits and seeds only where the tissue was dead or nearly so. Seeds of *Vicia faba*, fruits of *Viscum album* and the fruit pulp of *Pyrus* and *Malus* species proved to be always free of micro-organisms. *Prunus cerasus* and *Ribes uva-crispa* pulp occasionally contained yeasts and bacteria, but it was shown that such infections may originate from insect stings. The fungus *Phylllosticta tirolensis*, inoculated into young apple fruits, was found to remain in the core without doing any visible damage. *Bacillus vulgatus*, a parasite of the stigma of *Cucurbita pepo*, penetrated into the fruit in 91% of the cases investigated, but had no ill effect.

150. IZRAILSKIJ, V. P. (ISRAILSKI). 632.952
Natural bactericides and bacterial control. [Russian.] *Uspehi sovremennoji Biologii* (Advances in modern biology), 1945, 19: 358-71.

The author examines the various substances, such as penicillin, which micro-organisms excrete as a means of defence against one another. He considers not only their medicinal uses, but also the possibility of applying them to agriculture. *Trichoderma lignorum*, for example, produces a substance antagonistic to *Rhizoctonia*; and several species of *Bacillus* can be used for overcoming *Bacillus aroideae*, an organism pathogenic to tomatoes, cabbages, onions, and other horticultural crops.

151. PLACHY, E. 632.95: 638.16
Studie über die bakterizide Wirkung des Naturhonigs (Blüten und Blatthonig) aus verschiedenen Höhenlagen sowie einige Untersuchungen über die Eigenschaft der antibakteriellen Hemmungsstoffe (Inhibine) im Naturhonig. (The bactericidal effect of natural honey (flower and leaf) from different altitudes and investigations on the properties of its bactericidal agents.) *Zbl. Bakt.*, Abt. II, 1944, 106: 401-19, bibl. 11.

Mountain honey proved to have double the bactericidal effect of valley honey. Two types of leaf honey were found to be bactericidal at very low concentration. The nature of the bactericidal agent, called inhibine, is discussed.—Hochschule für Bodenkultur, Vienna.

152. GROSJEAN, J. 582.88: 632.48
Het parasitaire karakter van eenige Polyporaceen. (The parasitic nature of certain Polyporaceae.) *Thesis, Univ. Amsterdam*, 1942, pp. 96, bibl. 96.

It is generally accepted that in living trees the Polyporaceae cause wood rotting only in old trunks. In this investigation attempts have been made to bring about the decay of young (3- to 5-year-old) branches of living trees by inoculating them with various Polyporaceae. Most of the inoculations were on branches of forest trees. Points of horticultural interest are (1) a strain of *Fomes igniarius* isolated from the American service berry (*Amelanchier vulgaris*), infected oak, white poplar and alder, (2) *Fomes pomaceus* infected the cherry (*Prunus avium*). Although it has been accepted that trees are more susceptible in the winter to infection by wood rotting fungi than in any other season, no evidence was obtained that inoculations in early March gave better results than those in April and May. The decay spreads at a rate of only a few cm. a year.

153. CHAMBERLAIN, G. C. 634.11-242
An appraisal of spray materials for the control of apple scab in Ontario. *Sci. Agric.*, 1945, 25: 680-9, bibl. 6.

These spraying experiments show that lime-sulphur 1-40 or 1-60 is the most effective fungicide for controlling scab but cannot be considered safe under Niagara Peninsula conditions in view of the injury sometimes caused. If used as an eradicant in severe outbreaks the strength recommended is 1-60, and when in combination with wettable sulphur 1-80 for the pre-bloom and calyx applications. For the post-bloom applications a wettable sulphur alone is preferred. Flotation sulphur, in dry or paste form, and micronized sulphur proved the most effective and most reliable substitutes for lime-sulphur. The new organic fungicide Fermate proved very promising. In one trial Fermate, with lime and Orthex (a mineral oil type of spreader-adhesive), excelled all other treatments; the trees and fruit were outstandingly free from scab, but the trees showed more red mite injury and there was a greater infestation of the mite on the fruit at harvest than on the sulphur-sprayed trees.

154. KEITT, G. W., AND MOORE, J. D. 634.11-242
Apple scab control experiments with ground and tree spraying for 1944. *Wis. Hort.*, 1945, 35: 163-4.

By the use of an Elgetol ground spray it is possible to obtain satisfactory scab control by use of the milder tree-spray materials that do not cause severe injury to leaves or fruit. The following programmes in a ground-treated orchard gave less than 1% of scabbed McIntosh fruit: 1. Lime-sulphur, 1-50 in three treatments before bloom, followed by 5 treatments after bloom by either (a) flotation sulphur, 8-100, plus lime, 1-100, (b) kologof, 6-100, (c) mike sulphur, 5-100, plus lime, 1-100, or (d) fermate, 1-100, plus lime, 1-100. 2. An 8-spray programme of flotation sulphur, 10-100, plus lime, 1-100, plus orthex, 1-800, before bloom and 8-100 plus lime, 1-100, after bloom. 3. An 8-spray programme of fermate, 13-100, before bloom and 1-100 after bloom, with a pound of lime for each pound of fermate. Lead arsenate, 1-50, was used in all applications. Notes are given on when and how to apply the ground spray.

155. WOLLENWEBER, H. W., AND HOCHAPFEL, H. 632.48: 634.1/7
Beiträge zur Kenntnis parasitärer und saprophytischer Pilze V, 3. *Diplodia* und ihre Beziehung zur Fruchtfäule. (Parasitic and saprophytic fungi. Contribution V, 3. *Diplodia* and its relation to fruit rot.) *Zbl. Bakt.*, Abt. II, 1944, 106: 443-64.

Diplodia gallae was found to cause severe rotting of apples and quinces within 4 weeks of infection, while *D. hypodermiae* and *D. brunnea* infections spoiled only patches of 2-5 cm during the same period. A survey of the 16 species investigated shows that the mere occurrence of a *Diplodia* on the fruit does not allow of any conclusions on its noxious effect. The following species proved to be harmful in a high degree: *D. paradisica* and *D. palmicola*, isolated from a diseased banana and coconut respectively, as well as the wood-inhabiting *D. gallae*, *D. mutila*, *D. mutila v. major*, *D. rudis*, *D. patellaris* and *D. pseudodiplodia*. As harmless are noted: *D. palmarum*, *D. phoradendri*, *D. sarmentorum*, *D. hypodermiae* and *D. brunnea*. *D. visci* did not cause any infection at all. An identification key is presented.—Biologische Reichsanstalt, Berlin-Dahlem.

156. MOORE, M. H. 632.44: 634.15
A note on medlar cluster-cup rust (*Gymnosporangium confusum* Plowr.) in Kent in 1943 and 1944. From reprint *Trans. Brit. mycol. Soc.*, 1945, 28 (parts I and II): 13-5, bibl. 7.

The fungus and the symptoms it causes on medlars are described. Spraying the medlar with a 4-6-100 bordeaux

mixture would be a control measure worthy of trial where other considerations forbid the eradication of the teleutospore host, *Juniperus sabina*, in the vicinity of the medlar.—East Malling Research Station.

157. BANTA, E. 634.8: 632.3/8

Insects and diseases of the grape.

Amer. Fruitgr., 1945, 65: 9: 14, 15, 31.

This illustrated account of the chief insect pests and diseases of the grape vine includes the Michigan spray calendar for grapes, drawn up on the usual lines.

158. JENKINS, C. F. H. 631.67: 632.6/7

Entomological problems of the Ord River irrigation area.

J. Agric. W. Aust., 1945, 22: 131-45.

Grasshoppers are important pests of pasture and vegetable crops in the area. Leafhoppers may appear in plague numbers in October and November, and are very destructive to lucerne. Several vegetable pests, including the leaf-eating ladybird, the pumpkin beetle, and the beet webworm are widespread in the Kimberleys. Termites of several species are widespread and of importance as pests of agricultural crops as well as timber. Fruit pests include the orange-piercing moth, which is widespread and a notorious pest of citrus. No fruit flies of known economic importance have been recorded from the area, but one attacking native fruits was collected. Malarial and dengue fever mosquitoes are native to the region. The author maintains that strict quarantine measures should be observed to prevent both the introduction of pests into the area and the transportation of pests already there to the southern portions of the State.

159. TUNBLAD, B. 632.654.2

Vinterbesprutning mot rött spinn. Ha karbolineumpreparaten försämrats? (Winter washes against red spider. Have carbolineum preparations deteriorated?)

Växtskyddsnotiser, 1945, No. 2, pp. 17-9.

An investigation at the Swedish Plant Protection Station confirmed the complaints made by growers that the efficacy of carbolineum-mineral oil emulsion preparations against red spider has decreased, probably owing to the poorer quality of the mineral oil. The fact that the enemies of the red spider are more susceptible to the treatment than the pest has favoured a general increase in infestation. Control by lime-sulphur washes has been tested again, but cannot be recommended.

160. STODDARD, E. M., GRIES, G. A., AND PLUMB, G. H. 632.654.2

Red spider control with disodium ethylene bisdithiocarbamate.

Abstr. in Phytopathology, 1945, 35: 657.

In greenhouse experiments considerable success was obtained in the control of the common red spider or red mite (*Tetranychus bimaculatus*) by spraying with disodium ethylene bisdithiocarbamate (Dithane). When used with 0.00125% B-1956 spreader, the adults and nymphs of this pest were killed by all concentrations above 0.125% Dithane, and most of those in the egg stage were killed by a spray of 0.6%. A spray of 0.15% Dithane plus the spreader, repeated after ten days, controlled red spiders on strawberries and carnations. Spray injury was not severe below approximately 0.5% on strawberries and peaches, but some discoloration of carnation foliage occurred at a concentration of 0.15%. Experiments in which the spreader was omitted consistently showed less injury to the plants and a lower kill of the mite population.

161. DOEKSEN, J. 632.73

Bijdrage tot de vergelijkende morphologie der Thysanoptera. (A contribution to the comparative morphology of the Thysanoptera.)

Meded. Landb.Hoogescl. Wageningen, 1941, dl. 45, verh. 5, 92 pp., bibl. 96, 24 plates.

The Thysanoptera include a number of species that are pests

on cultivated crops, so that this account of the comparative morphology of the order will be of interest not only to the "pure" entomologist but also to the "economic" entomologist. The various organs are described in detail and figured in the 156 figures of the 24 plates.

162. LINDFORS, T. 632.753: 634.11

Förordning om blodlusens bekämpande. (Regulations governing the control of woolly aphis in Sweden.)

Växtskyddsnotiser, 1945, No. 2, pp. 27-9.

Woolly aphis has become notifiable in Sweden, where so far incidence of the pest is confined to western Skåne. Infested trees or parts thereof must not be moved to other places.

163. MENZEL, R. 634.836.72

Neue Möglichkeiten zur Bekämpfung der Reblaus bei Direktträgern. (New possibilities of *Phylloxera* control in direct producers.)

Schweiz. Z. Obst- u. Weinb., 1945, 54: 60-4, 73-7.

The lecture delivered at Wädenswil in January 1945 reports the results of extensive trials decided upon in a conference held in 1943 [see also H.A., 14: 139 and 549 (4)]. The experiments show that *Phylloxera* winter eggs deposited on hybrid vines are killed by a single but thorough application of fruit tree carbolineum (Veralin VI, 6%, or even ordinary Veralin, 4.5%) in March or in the first days of April before bud swelling. In view of the wide occurrence of leaf galls in hybrid vineyards it is strongly urged that this treatment should be made compulsory in all affected cantons of Switzerland.

164. ANON. 634.11-2.754

The apple leaf-hopper (*Typhlocyba froggattii*.)

Agric. Gaz. N.S.W., 1945, 56: 299-300.

The apple leaf-hopper or apple jassid is a pest in most apple orchards throughout New South Wales. Both the adults and immature or nymphal forms, which feed by sucking the sap, are to be found mainly on the undersides of the leaves; they cause the leaves to become mottled-grey and, as their numbers increase, the damage becomes more pronounced, the leaves turn yellow and fall prematurely. More serious damage, however, is caused by the insects settling on the fruit and depositing unsightly brown excrement, which is difficult to remove. The most satisfactory control is given by a spray consisting of 1 pint of nicotine sulphate plus 3 lb. hard soap to 75 gal. water. Two applications are recommended, the first to be made just before the first leaf-hoppers reach their winged stage and the second 3 to 4 weeks later. These two sprays can be conveniently and more economically combined with the calyx spray and first cover spray of arsenate of lead used for the control of codling moth, but if this is done the soap must be omitted.

165. RITCHER, P. O. 634.75-2.76

Control of the strawberry crown borer by methyl bromide fumigation and with poison baits.

Bull. Ky agric. Exp. Stat. 468, 1944, pp. 28, bibl. 28.

Two new methods of controlling strawberry crown borer [*Tyloclerema fragariae*] were developed—methyl bromide fumigation of plants to be used for setting new patches, and poison bait for destroying adult crown borers. The safest dosage of methyl bromide for commercial use was found to be 3 lb. per 1,000 cubic feet for 2 hours at chamber temperatures within a range of 65°-83° F. and at load temperatures of 65°-75° F. With this dosage there was complete mortality of crown borer adults, eggs, and larvae, and no subsequent plant injury. Two poison baits tried were effective in killing adult crown borers whether feeding on strawberry or cinquefoil foliage. One bait was a commercial preparation made of dried chopped apple refuse coated with 3½% of sodium fluosilicate, and the other was made of dried chopped apple pomace coated with 2½% of lead arsenate. In one

field test baiting reduced subsequent infestation of mother plants by over 80%. [Author's summary.]

166. VAN MARLE, G. S. 634.2-2.78
Boorders in *Prunus triloba*; resultaten van het onderzoek in 1942. (Bark borers in *Prunus triloba*; results of an investigation in 1942.)
Mim. Rijkstuinbouwvoorzicht Dienst, Aalsmeer, 1943, 7 pp.

Holes in pruning snags and in other parts of the stems of *Prunus triloba* were found to be mostly caused by the caterpillars of the tortrix moth *Grapholitha woerberiana*. Infested wood kept in insect gases yielded moths, about 80% of which were *G. woerberiana* and 20% *Alabonia bractella*, and in addition an ichneumon fly, apparently a parasite of the *Grapholitha*. Some control was effected by painting the affected parts with oil (maize oil and pea-nut oil, in place of cotton-seed oil—which was unobtainable) and with oil containing paradichlorobenzene.

167. SCHNEIDER, F. 632.77: 634.2
Zur Bekämpfung der Kirschenfliege und des Pflaumenwicklers. (The control of the cherry fly and the red plum maggot.)
Schweiz. Z. Obst- u. Weinb., 1945, 54: 252.

Cherry fly was successfully controlled by a single spraying with 1% Gesarol [0.05% DDT]. The timing of the application is critical and must be determined by the activity of the insect and not by a calendar date. Similarly the control of the red plum maggot by nicotine requires the application to be timed in relation to egg-laying by the moth. In seasons of heavy infestation a second spraying may be necessary.

H.S.

168. WHITTE, J. N. 632.5
Control of wild onion or scented garlic.
Agric. Gaz. N.S.W., 1945, 56: 401.

The wild onion, onion weed, or scented garlic infests gardens in certain parts of New South Wales. No weed killer is sufficiently effective and digging up or forking out the bulbs is recommended.

169. BAKKE, A. L., and GAESSLER, W. G. 632.5
The effect of reduced light intensity on the aerial and subterranean parts of the European bindweed.
Plant Physiol., 1945, 20: 246-57, bibl. 28.

Trials show that a successful smothering crop for the eradication of *Convolvulus arvensis* works essentially by restricting the light. Enough shade must be produced early in the growth of the predominating plant.

170. BEACH, F. H. 632.5
Protect orchard workers. Avoid the misery of ivy poisoning.
Amer. Fruitgr., 1945, 65: 8, 9, 14, 15, 17.

The poison ivy [*Rhus toxicodendron*] has become a very serious pest in many of the older apple orchards of Ohio. It not only reduces the yield of the trees but it is a menace to orchard workers, many of whom are afraid to expose their hands when poison ivy is present. It grows in patches that carry the very characteristic tripartite leaves. For killing poison ivy a spray solution made up to contain three-quarters to one pound of ammonium sulfate weed-killer per gallon is usually satisfactory and will treat about 100 square feet of poison ivy ground surface, while at a low cost 2,4-dichlorophenoxyacetic acid provides satisfactory control.

171. STAHEL, M. 632.693.2
Die Verhütung und Heilung von Wildschäden im Obst- und Weinbau. (Prevention and cure of damage to fruit trees and vines by hares and deer.)
Schweiz. Z. Obst- u. Weinb., 1945, 54: 443-7.

In Switzerland the winter injury to fruit trees and vines caused by hares and, to a lesser degree, by deer is considerable. In the Aargau alone about 22,000 trees were

reported as damaged during the winter of 1941/42. Apple trees are preferred by the animals, zwetschen and plums are somewhat less popular, while pears and sweet and acid cherries rarely suffer. In early winter the pests go for the buds of bush trees, later they feed on shoots, branches and the trunk. In 1941/42 apple standard trees up to a diameter of 20 cm. were attacked. In severe winters vine buds are also eaten. Certain kinds of oil used as repellents are hardly less harmful than hares, whereas greasing the trees with bacon rinds is noted as a successful control measure of pre-war days. Good results with fruit trees and vines are reported from tests with a repellent mixture consisting of 10% emulsified carbolineum (e.g. Veralin VI) and 10% milk of lime. The liquid may be applied by spraying. Standard trees are best protected by tying straw around them, as a possible substitute for which fir branches or reeds may be used, but not paper or sacking. Wounds should be trimmed and treated with grafting wax, bridge grafting may also be useful. Where the wood is laid bare around three-quarters of the trunk or branch no remedy can be suggested. The pruning of damaged vines is also discussed.

172. HARTSUIJKER, K. 632.952
Het wetenschappelijk onderzoek van fungiciden. (The scientific investigation of fungicides.)
Thesis, Univ. Amsterdam, 1940, 143 pp., bibl. 200.

The historical development of plant disease control is first reviewed; in recent years it has been realized that field trials should be preceded by laboratory experiments. The experiments on the toxicity of fungicidal materials carried out by the author were based on McCallan's method. The fungi used were *Venturia inaequalis*, *V. pirina*, *Phytophthora infestans*, *Cladosporium fulvum*, *Septoria apii graveolentis*, *Ascochyta pisi*, *Helminthosporium sativum* and *Botrytis cinerea*. The technique of testing is described. The experimental work falls into three groups: (1) The toxicity of 5 metal salts, CuSO_4 , HgCl_2 , NiSO_4 , and ZnSO_4 . Of these ZnSO_4 proved to be least toxic and hardly lethal. The strongest effect was shown by CuSO_4 and HgCl_2 , the latter being considerably the more lethal. The results with NiSO_4 were very divergent with the various fungi: to *Botrytis cinerea* it was the most toxic of all the salts. (2) The toxicity of a number of sulphur compounds, viz. three different polysulphides (Ca -, NH_4 -, and Ba -polysulphides), Ca -monosulphide, and a colloidal bentonite sulphur. A marked difference between the direct and the protective fungicidal action was observed only in the case of the three polysulphides. The protective fungicidal action of the polysulphides was better than that of the other two sulphur preparations. (3) The toxicity of mixtures of polysulphides (Ca and NH_4) and lead arsenate and the effect of the addition of materials such as lime and ferrous sulphate on these mixtures. The fungicidal action of combinations of 1% polysulphide and 0.1%, 0.3% and 0.5% lead arsenate was slightly better than that of polysulphide alone. The addition of lime reduces the toxicity somewhat, whereas ferrous sulphate improves it.

173. GROVES, A. B. 632.952.11
Sulphur sprays.
Bull. Va agric. Exp. Stat. 359, 1944, pp. 22, being *Pap. Sec. Bot. Plant Path. Va agric. Exp. Stat.* 121.

The purpose of this bulletin is to present the more pertinent information about sulphur materials and their usefulness as related to the needs of fruit growers. The various types of products, their characteristics, adaptation and limitations are discussed under the following heads: Preparation and dilution of lime-sulphur, adaptability and disadvantages of lime-sulphur, dry lime-sulphur, the elemental and wettable sulphurs, non-proprietary products, the proprietary sulphurs, fractionation methods, product adaptability, elemental sulphurs in the Virginia spray programme, manner and rate of usage.

174. ANON. 632.95: 351.823.1
The Pest Destroyers' Act, 1945, is now in operation.
Agric. Gaz. N.S.W., 1945, 56: 431-2.
- The Pest Destroyers' Act, 1945, came into operation as from 1 September. It regulates the sale and prevents the adulteration of all pest, disease and weed control substances, and provides for the registration of all those of approved composition. The main provisions are set out; they relate to the particulars required in the application for registration and the details that must be shown on the labels of packages offered for sale.
175. INGELSTRÖM, E. 632.3/8
Växtdoktorn. Handledning i kampen mot trädgårdens skadegörare. (The plant doctor. The control of pests and diseases of garden plants.)
Saxon & Lindströms förlag, Stockholm, 1945 (?), Kr. 4.50, from review *Växtskyddsnotiser*, 1945, No. 4, pp. 63-4.
- The author is an officer of the Swedish Plant Protection Station, Stockholm, and his recommendations on control measures express, as a rule, the latest views of the Station.
176. CHAMBERS, E. L. 632.951
What's new in garden insect control.
Wis. Hort., 1945, 35: 148.
- Brief notes on sabadilla, DDT, cryolite and sodium fluosilicate. Aerosol bombs are mentioned as a wartime development for dispensing nicotine, pyrethrum and other contact sprays. In New York State a type of mortar shell carrying an arsenical dust has been successfully demonstrated for applying dust to the tops of large trees.
177. WALLACE, M. D. 632.951
Sabadilla, an insecticide to control the squash bug.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 284.
- The insecticide is prepared by activating or finely grinding the seed and diluting with sulphur or talc according to the crop on which it is to be used. In tests on the squash bug (*Anasa tristis*) it proved several times as toxic as pyrethrum.
178. WHITE, D. G. 632.951
A comparison of the number of protoxylem strands with the rotenone content of derris roots.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 370-4, bibl. 8.
- It was found impossible to correlate the number of protoxylem strands with rotenone content of individual roots or those of varieties.—Mayaguez, Puerto Rico.
179. SMITH, J. H. 632.96
Principles of biological control.
Qd agric. J., 1945, 61: 87-8.
- A brief review, without specific examples, of the working principles involved in the application of biological control methods against insect pests.
180. WILCKE, J. 632.96
De nederlandse Pompilidae. (The Dutch Pompilidae.)
Meded. LandbHoogesch. Wageningen, 1943, dl. 47, verh. 1, 88 pp., bibl. 44, 3 plates.
- Species of this family of wasps are predaceous and thus may be considered as beneficial insects. After an introduction of little over a page this work deals with terminology, a list of the Dutch species, systematics, literature, and an alphabetical list of genera and species and gives detailed descriptions of the 53 species found in Holland. The three plates are supplemented by 79 other figures.
181. SCHNEIDER, F. 632.95: 634.1/8
Der heutige Stand der Schädlingbekämpfung im Obstbau. (The present position of pest control in relation to fruit-growing.)
Schweiz. Z. Obst- u. Weinb., 1945, 54: 143-7, 151-5.

This report of a lecture contains useful comments of Swiss experience with pest-control measures in recent years. A plea is made for recognition of the common interests of manufacturers, growers and research stations. The mode of action and relative merits of tar-oil washes and dinitroresol [sodium salt] washes are discussed. Because the dinitroresol derivative is water-soluble and requires an appreciable time to penetrate the insect eggs, cool, damp conditions in which the spray remains wet for a long time favour the most successful results. Control of aphides by these "straight" dinitroresol washes has not always been satisfactory. The outstanding event of recent years has been the introduction of Gesarol* which has been widely tested against a variety of insects. The promise that Gesarol might displace lead arsenate in codling moth control has not, so far, been fulfilled. Results have been variable, largely because of the difficulty of securing satisfactory adhesion and stability to rain without impairing the contact activity of the substance. This same difficulty has militated against the control of plum red maggot by Gesarol. Furthermore, a notable increase in red spider has followed the use of Gesarol for codling moth control. It has been observed that while red spider itself is resistant to Gesarol, several insects predaceous upon this mite are highly susceptible. Because of these facts Gesarol is no longer recommended for use against these two pests. On the other hand successful results have been obtained against apple blossom weevil, cockchafer, plum sawfly, and cherry fly. Results against aphides have not been good. Fears that the widespread use of Gesarol might have a disastrous effect on bees have not been realized. Nevertheless Gesarol should not be sprayed on to open flowers. The economics of pest and disease control are discussed. The expenditure involved should be considered as an insurance premium rather than an outlay which brings in an immediate and obvious return. H.S.

182. WIESSMANN, R. 632.76: 632.951
Erfolgreiche Bekämpfung des Maikäfers mit Gesarol. (Successful control of the cockchafer with Gesarol.)
Schweiz. Z. Obst- u. Weinb., 1945, 54: 159-66.
- Laboratory tests showed that 1-2% Gesarol [0.05-0.1% DDT] was fatal to cockchafer beetles after about five hours contact. Exposures of up to three hours caused slight paralysis from which the insects could recover. Glasshouse and field trials confirmed the toxicity of DDT and also showed it to be a powerful deterrent from feeding. Commercial trials using 2% Gesarol on cherries were highly successful and winter moth caterpillars were controlled incidentally. A second spraying may be necessary in the case of heavy attacks. The author sees little danger to bees even by spraying in bloom, but this view is questioned in an editorial postscript and growers are advised to avoid spraying then until further information on this point is available. H.S.
183. SCHNEIDER, F. 632.951
Können sich mit Gesarol vergiftete Insekten wieder erholen? (Can insects poisoned with Gesarol recover?)
Schweiz. Z. Obst- u. Weinb., 1944, 53: 401-2.
- The author undertook a critical examination of the assertion that insects affected by Gesarol cannot recover, and inevitably die as a result. He found this to be quite true of house-flies, but not so of certain hover-flies (Syrphids). These were apparently able to make a complete recovery even from repeated doses, each of which had produced characteristic convulsions. This observation is important in suggesting that some beneficial insects may be less readily affected than some pests. H.S.

*For other articles on DDT see subsequent abstracts and nos. 195, 229-234, 259.

184. THIEM, H. 634.1/7-2.951
Ergebnisse der Reichsprüfung arsenfreier Schädlingsbekämpfungsmittel im Obstbau. (German Government tests of non-arsenical chemicals for the control of pests in fruit growing.) *Reichs-Pflanzenschutzbl.*, 1944, 2: 13-6, from abstract *Zbl. Bakt.*, Abt. II, 1944, 100: 493-4.
Gesapol or preparations of similar chemical composition have proved very effective against a number of pests of fruit trees and soft fruit both as sprays at a concentration of 1% and as dusts. Gesapon at 0.5% gave good results against aphids.
185. STELLWAAG, F. 634.8-2.951
Ergebnisse der Reichsprüfung arsenfreier Schädlingsbekämpfungsmittel im Weinbau. (German Government tests of non-arsenical chemicals for the control of pests in viticulture.) *Reichs-Pflanzenschutzbl.*, 1944, 2: 16-20, from abstract *Zbl. Bakt.*, Abt. II, 1944, 106: 494.
Gesapol and similar preparations have proved effective, applied both as sprays and dusts, against a number of vine pests which are enumerated. Resistance in the larvae was found to increase with age. Cockchafers can also be controlled with it.
186. BUSVINE, J. R. 632.951
Insecticidal action of D.D.T.
Nature, 1945, 156: 169-70, bibl. 4.
The general conclusion to be drawn from the data presented here seems to be that, at present, no theory can satisfactorily be formulated on the action of D.D.T. Some attempts to support current hypotheses with quantitative data have met with no success. Of particular interest is the low toxicity of the ortho-para D.D.T. and the fairly high toxicity of the dimethoxy compound. It seems possible that the shape and size of the molecule are important. [From author's summary.]—Ministry of Health at London School of Hygiene and Tropical Medicine.
187. WASON, E. J. 632.951
D.D.T. as an insecticide. Results of preliminary trials.
Agric. Gaz. N.S.W., 1945, 56: 498.
The author records success with DDT against the cabbage moth, grey aphid, and green peach aphid (*Myzus persicae*) on cabbages and against the black peach aphid (*Anuraphis persicae-niger*) on young peach trees. Twenty-four hours after spraying the peach trees no live aphids could be found, and 42 days after spraying no trace of aphids was observed on those portions of the trees which received the initial spray, although small colonies were found in the blossoms and new growth 35 days after spraying. On the unsprayed trees the aphid population gradually increased, and at the end of the 42-day period the infestation was so severe that new growth was markedly retarded.
188. STARR, D. F. 632.951
Use of a double-nozzled spray apparatus for the application of DDT or oils.
Science, 1945, 102: 156-7.
A deposit of DDT superior in quantity and quality to that produced by ordinary methods was obtained by combining the water and the insecticide after they leave the spray nozzle at a distance of 2-4 cm., a pair of nozzles converging at an angle of about 35° spraying one of the two components each. A DDT solution was sprayed from a small atomizer into a water spray coming from a suction type paint sprayer. The method was successfully tried on glass, oranges and apples with DDT solutions prepared both with water-miscible solvents and in solvents other than those miscible with water. The deposits of DDT on glass proved extremely resistant to artificial rain, and there was no evidence that the insecticide washed off the apples any more readily than
- from the glass. Some nascent precipitate of DDT from acetone spray on glass was not visibly decreased after 7 hours of pounding from rapidly dropping water. It is anticipated that some of the advantages of the multispray process over the spraying with a concentrated DDT solution may be revealed after practical field trials. In this preliminary stage it appears that the inclusion of the water spray should be useful as a carrying medium in orchard or truck crop spraying, among other reasons because it will decrease the danger of foliage injury. With oils, the instability of the oil-in-water dispersion makes it possible to build a heavy deposit of oil on the surface without losing much in the water that is draining away.—U.S. Department of Agriculture, Beltsville, Maryland.
189. HADORN, C. 632.951: 634.1/7
Erfahrungen mit Dinitrokresol als Winterspritzmittel für den Obstbau. (Experiments with dinitrocresol as a winter spray material in fruit culture.) *Schweiz. Z. Obst- u. Weinb.*, 1945, 54: 84-90.
This article reports a semi-popular lecture. The history, merits and mode of action of dinitrocresol preparations, used as simple alternatives to tar-oil washes, are reviewed. It is stated that control of aphides is best when spraying is carried out in damp, slow-drying conditions and that late spraying is more effective than early spraying. The need for thorough application and complete wetting of the trees is stressed. H.S.
190. DIERICK, G. F. E. M. 632.951.4: 634.1/7
De ovidie werking van wintersproeimiddelen bestudeerd in het laboratorium. (Laboratory studies of the ovidical action of winter sprays.) (English summary 5½ pp.)
Thesis, Univ. Amsterdam, 1942, 117 pp., bibl. 56.
The eggs of the mediterranean flour moth were used instead of aphid eggs in this investigation, for not only are they available all the year round but they yield more accurate and comparable results. Check experiments on aphid eggs, however, remain necessary. Results obtained in treating loose eggs by the suction method do not differ essentially from those obtained by dipping eggs attached to twigs. The high toxicity of dinitro-o-cresol preparations must probably be ascribed solely to the toxicity of the undissociated acid molecules. The dinitro-o-cresolate ions and undissociated salt molecules have little or no ovidical effect. Ammonium dinitro-o-cresol is more toxic than its potassium, sodium or lithium salts. In an alkaline liquid, dinitro-o-cresol, used together with mineral oil, produces a lower, in an acid liquid a higher kill than that which may be expected from the combined effects of the two components separately. Toxic substances, when used at a concentration at which they do not kill the eggs completely, markedly retard the rate of egg development. A dinitro-o-cresol solution of very low concentration has a stimulating, not a toxic effect; this stimulation accelerates egg development. In the case of the mediterranean flour moth eggs an oil emulsion kills young eggs more readily than old eggs, on the other hand dinitro-o-cresol is more toxic to old eggs. [From author's summary.]
191. SCHNEIDER, F. 632.952: 634.1/7
Vergleichende biologische Prüfung von Winterspritzmitteln. (Comparative biological tests of winter washes.) *Schweiz. Z. Obst- u. Weinb.*, 1945, 54: 437-43.
A very simple method of evaluating winter washes on a large scale under natural conditions is described and illustrated. At a convenient spot outside, a frame, 1.50 m. broad and 4-50 m. long, of poles and laths, is put up, and across this 25 laths, 2 m. long, are placed parallel and close to each other, loosely held between two iron clamps. On each lath 40 numbered clothes pegs are nailed, each holding the piece of a branch with masses of eggs on it. The eggs used in the

trial reported were those of the green apple aphid (*Aphis pomii*) and winter moth (*Operopthera brumata*). Suggestions are made for collecting branches with aphid eggs on them and for having winter moth eggs deposited on branches. One litre of every spray mixture to be tested is prepared and the branches are dipped into the solution for 10 seconds with a slightly stirring movement. The results obtained from the treatment with 26 winter washes and pastes are tabulated and may be briefly summarized as follows:—(1) With the exception of Veralin VI, which effected a 100% kill of the eggs of both pests, the ordinary and emulsified carbolineum preparations tested proved really effective only against one or the other of the two pests. (2) With the exception of the American preparation Volck Hiver, which gave good results against winter moth eggs, oil emulsions proved unsatisfactory. (3) Of the dinitro-cresol preparations tested against winter moth eggs only pastes were successful, while dusts did not exceed 30-71% kills. In agreement with results obtained by S. F. Dierick (see *H.A.*, 16: 190) the effect of dinitro-cresol was found to be associated with its pH value, pH 7.3-7.8 being superior to pH 9.7-10.0. (4) Applications of dinitro-cresol paste during the period from the middle of December to the beginning of February yielded a kill of winter moth eggs of 32-86%, while 2% Nicrol-Paste applied during the period from the end of February to the middle of March killed 98-100%. (5) The dinitro-cresol preparations Nicrol-Paste and Sandolin dust gave excellent results at low concentrations against green apple aphid eggs between the middle of December and the end of March.—Wädenswil Research Station.

192. FELBER, I. M. 632.951
Film formation and structure of some oil emulsions.
J. agric. Res., 1945, 71: 231-54, bibl. 14.

A microscopic study of the film formation and structure on glass and other surfaces of two groups of oil-in-water emulsions, namely (1) those which are composed of dispersions of vegetable oils in water with the presence of ammonium salts of fatty acids, proteins and bentonite, and (2) proprietary oil emulsions, which consist of petroleum oils dispersed in water, the emulsifying ingredients not being specified.

193. DEAN, F. P. 632.95
Injector helps in mixing sprays.
Better Fruit, 1945, 39: 10: 13.

Since regular tank fillers are awkward to handle and are not always available, a small injector made from ordinary pipe fittings has been designed, which may be used for experimental or practical orchard spraying. Such an injector is figured, in parts and when the parts are assembled.

194. ANON. 638.1: 632.951
Zijn de sproeiprodukten gebruikt op de fruit-boomen schadelijk voor de bijen? (Is the spraying of fruit trees detrimental to bees?)
Cultuur Hand., 1941, 9: 19-20.

The conclusions drawn are: To renounce modern methods of using sulphur and arsenical products in Belgian fruit growing is unthinkable. The substitution of arsenic by the so-called non-poisonous substances has not yet received attention. Lime-sulphur repels bees. Arsenical sprays do not as a rule attract bees and are not absorbed by them unless sugar is added to the spray fluid. Sprays containing lime-sulphur and arsenate are avoided by bees, and even when they contain sugar (10%) the bees do not find them attractive. The trees should not be sprayed when in full bloom.

195. K[OBEL], F. 638.1: 632.951
Gesarol und Bienenzucht. (Gesarol and bee-keeping.)
Schweiz. Z. Obst- u. Weinb., 1945, 54: 91.

A conference is reported in which valuable experience was presented of several years' commercial use in Switzerland

of Gesarol [a DDT preparation], especially for the control of the cockchafer [or May bug]. Even though the contact action of Gesarol against bees is less than that against flies and beetles, there remained a substantial risk that bees might be seriously affected. Representatives of bee-keepers, fruit-growers, and spray manufacturers agreed that Gesarol should not be applied to any fruit during the period of open blossom, but that with this precaution, experiments on control measures should be continued, careful watch being kept for signs of adverse effects on bees. H.S.

196. SCH[NEIDER], F. 638.1: 632.951
Winterspritzung mit Dinitrokresol-Präparaten und Bienenzucht. (Winter spraying with dinitro-cresol preparations in relation to bee-keeping.)
Schweiz. Z. Obst- u. Weinb., 1945, 54: 91-2.

It is recommended that as far as possible late applications of dinitrocresol should be made only in dull conditions that do not favour the activity of bees. If spraying is carried out in fine weather, neighbouring bees should be kept in the hives until the wash on the trees and on the ground has dried.

197. JONES, J. S., AND HATCH, M. B. 632.951
Spray residues and crop assimilation of arsenic and lead.
Soil Sci., 1945, 60: 277-87, bibl. 16.

Arsenic and lead have figured prominently in the poisoning of both human beings and livestock by adherence of their compounds to foodstuffs, and there has been some suspicion that crops grown on land formerly under fruit might accumulate sufficient arsenic or lead in their tissues as to become a menace when eaten. The work described supports a negative conclusion. Instead it gives warning that inability on the part of many of the more shallow-rooted crops to make even fair growth and reduced yields on the part of others, will be the most discouraging of the several factors involved in the reclamation of commercial orchard lands for food and forage crop production.

198. PARRIS, G. K. 632.944
The nematocidal and fungicidal value of D-D mixture and other soil fumigants.
Phytopathology, 1945, 35: 771-80.

D-D mixture* has been found to be an effective nematocide against *Heterodera marioni* (Cornu) Goodey at rates as low as 150 lb. per acre. No covering of the soil, other than a possible wetting of the surface, seems necessary for good retention of fumes of the chemical. In limited comparisons, in which bush, snap, and lima beans, tomatoes, potatoes, and celery were used, D-D mixture was the equal of chloropicrin as a nematocide. D-D mixture seems to possess little value as a fungicide in soil disinfection studies with the damping off and other fungi. D-D mixture has a slight phytocidal action if plants are set out in treated soil too soon after the treatment. At 150 lb. per acre, no injury has been found if 2 weeks elapse between treatment and time of planting. In cold soils, the time interval for safety may be 3 weeks or longer according to plant and dosage. D-D mixture may be applied to cold soil (30°-40° F.) and its effectiveness as a nematocide does not seem to be impaired. [From author's summary.]

199. MULDER, D. 632.944
Biologisch onderzoek van grondontsmettingsmiddelen. (Biological investigations on soil disinfectants.)
Thesis, Baarn, 1943, pp. 114, bibl. 57.

The aims of this investigation were (a) to draw up a chemotherapeutic index for soil disinfectants, (b) to develop an experimental method to obtain this index, (c) to collect data concerning the decrease in effectiveness of a disinfectant brought about by contact with the soil, (d) to determine a *dosis curativa* for disinfectants in soil, (e) to test the usefulness

* Mixture of dichloropropylene and dichloropropane. See *H.A.*, 14, 360.

of certain new methods of disinfecting soil. The materials used were the ordinary seed and soil disinfectants (except carbon disulphide and chloropicrin) and a number of organic mercury compounds. *Pythium de baryanum* in 0.5% saccharose solution was used as the test fungus in determining the *dosis toxica*. The determination of the absorption of the disinfectants was carried out both for garden soil and absorbent coal. Phenyl mercury compounds are absorbed 10 times as strongly as ethyl mercury compounds. Optimal conditions for damping-off disease were obtained by using a closed experimental chamber with natural lighting, heated to 25°-30° C.; under these conditions the *dosis curativa* in leaf mould was determined. The investigation shows the importance of soil disinfection for obtaining maximum productivity of seeds used in horticulture, particularly in seed-boxes. The value of formaldehyde as a dry powder is shown; mercury compounds, too, can be applied in powder form. Experiments with cuprous oxide and zinc oxide give evidence of the possibilities of these chemicals as soil surface dusts and in seed treatments for the prevention of pre- and post-emergence damping-off.

200.

- a HANSEN, C. J. 546.27: 634.63
Boron content of olive leaves.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46:
78-80, bibl. 3.
- b JAMALAINEN, E. A. 632.48(471.1)
Über die Fusarien Finnlands. (The *Fusaria* of
Finland.) Part I.
Valt. Maatalousk. Julk., 1943, No. 122, pp. 26, bibl.
59. Part II, *ibidem*, 1943, No. 123, pp. 25,
bibl. 28. Part III, *ibidem*, 1944, No. 124,
pp. 24, bibl. 17.
- c MARTH, P. C., DAVIS, F. F., AND MITCHELL, J. W. 577.15.04: 632.954
Herbicidal properties of 2, 4-dichlorophenoxyacetic
acid applied in dusts containing hygroscopic agents.
Bot. Gaz., 1945, 107: 129-36, bibl. 4.
- d NIETHAMMER, A. 576.85+582.822.3
Hefen sowie mikroskopische Pilze aus Blüten,
ferner von Samen und Früchten. (Yeasts and
microscopic fungi from flowers, seeds and fruits.)
Arch. Mikrobiol., 1942, 13: 45-59, from abstract
Zbl. Bakt., Abt. II, 1944, 106: 378-9.

- e OSSIANILSSON, F. 634.722-2.753
En för Sverige ny bladlus på röda vinbärsbuskar.
(The red currant aphid, *Rhopalosiphoninus*
ribesinus, recorded for the first time in Sweden.)
Växtskyddsnöiser, 1945, No. 4, pp. 56-7.
- f PROFFT, J. 634.25-2.753
Zur Verbreitung der grünen Pfirsichblattlaus,
Myzodes (= Myzus) persicae Sulz. in Nord-
deutschland im Zusammenhang mit dem Problem
des Kartoffelabbaus. (The distribution of the
green peach aphid, *M. persicae*, with special
reference to the problem of potato-virus diseases.)
Arb. physiol. angew. Ent., 1942, 9: 137-57,
from abstract *Zbl. Bakt.*, Abt. II, 1944, 106:
398-9.
- g SCHANDERL, H. 576.85
Ein Beitrag zur Frage der Isolierbarkeit von
Mikroorganismen aus normalem pflanzlichen
Gewebe und eine Kritik der sogenannten "Knöll-
chen-theorie". (The isolation of microorganisms
from normal plant tissue and a criticism of the
so-called nodule theory.)
Biol. gen., 1943, 17: 311-37, from abstract *Zbl.*
Bakt., Abt. II, 1944, 106: 482-3.
- h SMIT, J., AND MULDER, E. G. 632.19: 631.811.6
Magnesium deficiency as the cause of injury in
cereals.
Meded. Landb. Hooges. Wageningen, 1942, dl.
46, verh. 3, 43 pp., bibl. 37, 8 plates.
- i STAPP, C. 632.314
Der Pflanzenkrebs und sein Erreger *Pseudomonas*
tumefaciens. XIV. Mitteilung. Die Pappel als
Wirtspflanze. (Crown gall and its causal organ-
ism *Pseudomonas tumefaciens*. 14th Commun.
The poplar as host plant.)
Zbl. Bakt., Abt. II, 1944, 106: 430-43, bibl. 12.
- j TUKEY, H. B., HAMNER, C. L., AND IMHOFF, B. 632.954
Histological changes in bindweed and sow thistle
following application of 2, 4 dichlorophenoxyacetic
acid in herbicidal concentrations.
Bot. Gaz., 1945, 107: 62-73, bibl. 11.

VEGETABLE, DRUG AND OTHER PLANTS.

201. RHINER, O., AND OTHERS. 645.1/7(494)
Der Schweizer Gemüsebau. (Vegetable growing
in Switzerland.)
Huber & Co., A. G., Frauenfeld, 1945 (?), pp.
213, Fr. 7.20, from review *Schweiz. Z. Obst- u.*
Weinb., 1945, 54: 253.

A number of authors, among them the vegetable experts from Wädenswil, have collaborated to produce this well illustrated book on all aspects of vegetable growing.

202. LUGEON, A. 635.1/7(494)
La culture des légumes. (Vegetable growing in
French Switzerland.)
Payot, Lausanne, 1945 (?), Fr. 7.80, from review
Schweiz. Z. Obst- u. Weinb., 1945, 54: 253-4.

The book is written for the requirements of vegetable growers in French Switzerland.

203. LAMM, R., TOMETORP, G., AND VOSS, Å. 635.1/7(48.5)
Sort-och stamförsök med köksväxter år 1944.
(Vegetable strain and variety trials [at Alnarp] in
1944.) [English summary 24pp.]
Reprinted from *Arsskr. Alnarp's Lantbruks-
Mejeri-Trädgårdst.*, 1944, pp. 165-202, bibl. 31,
as *Meddel. Svatens Trädgårdsförsök* 26.

The report deals with the latest results of tomato, pea,

carrot, garden-beet and celeriac variety trials carried out at Alnarp.

204. VASILIEV, V. L. 635.1/7: 631.531: 581.02
The influence of place of origin of seeds on develop-
ment and yield of vegetables in the far north.
[Russian.]
Vest. Soc. Rast. (Soviet Plant Industry Record),
1941, No. 1, pp. 56-60.

The yield and quality of vegetables grown from seed, selected and propagated locally, were superior to those of vegetables grown in the same localities as the first, but from seed brought from farther south.

205. PREOBRAZHENSKI, G. N. 635.1/7: 631.523
Fifteen years' work of the Birjučkut vegetable
breeding station. [Russian.]
Ovoševodstvo (Vegetable growing), 1940, No. 10,
pp. 20-4.

This article starts with a general account of the work of a plant breeding station for vegetables, founded in 1925 in the Rostov province. This is followed by a description of 58 new or improved varieties of vegetables raised on the station, and there are notes on (1) the advantage of planting onions for seed in autumn rather than in spring, (2) methods adopted for obtaining good crops of tomatoes, cucumbers

and water melons, in the open, (3) control measures against certain vegetable diseases.

206. DE VILLIERS, G. D. B. 635.1/7
Climate and the cultivation of vegetables.
Fing. S. Afr., 1945, 20: 729-34.

The following natural factors contribute towards making the Cape Flats a unique region for the cultivation of vegetables:—(1) Sandy nature of soil; (2) the compensation for an ineffective distribution of rainfall by the presence of a high water table; (3) a mild winter (53° to 54° F.); (4) a cool early summer (60° to 65° F.); (5) a mild summer (66° to 68° F.); (6) a high soil-surface temperature during part of the day; (7) a high humidity, even during the day, which remains very constant from month to month (51%-56%); (8) a good fall of dew; (9) the absence of heavy frost. [Author's summary.]—Western Province Fruit Research Station, Stellenbosch.

207. JAKUŠKIN, I. V. 631.531
The better utilization of seed and other propagating material. [Russian.]
Proc. Sci. Conf. Timirjazev Agric. Acad. 3-10 June, 1944, 1945, No. 1, pp. 20-1.

Because of the large proportion of propagating material which perishes or fails to contribute materially to the ultimate yield, every means must be sought to increase the efficiency of propagation. Methods of sowing must be so contrived that the rate of seeding can be reduced to a minimum; the waste resulting from thinning out plants must be reduced as much as possible; and every opportunity taken to make the soil give the greatest return for the least expenditure of seed. Horticultural, plantation, and ordinary farm crops are considered.

208. NEIŠTADT, M. I. 631.411.4
The work of the Central Peat Experimental Station of the Commissariat of Agriculture during the War. [Russian.]
Sovetsk. Botan., 1945, 13: 1: 72-6.

Part of the article discusses the importance of peat lands on account of the sphagnum moss growing on them. Composts of peat combined with lupins, dung, ash, phosphatite, or other materials—often obtainable locally—have been successfully used in place of artificial manures, and to supplement dung. Table beet and other vegetables have done well on such composts.

209. BJORNSETH, E. H. 635.1/7: 631.8
Fertility levels for the growing of vegetable plants.
Quart. Bull. Mich. agric. Exp. Stat., 1945, 28: 27-34.

Tomato plants suitable for field setting can be grown at a nitrate level varying from 25 to 50 parts per million and a potassium level varying from 15 to 35 parts per million, in the soil at the time of pricking off. Pepper plants satisfactory for field planting can be grown at a nitrate level varying from 10 to 50 parts per million and a potassium level of 5 to 40 parts per million, in the soil at the time of pricking off. It is probable that a more rapid growth can be obtained by growing pepper plants at a lower level of nitrate and potassium and then supplementing with nitrate and potassium fertilizers in solution later in the growing period. [From author's summary.]

210. BROWN, H. D., DUNN, R., AND ALBAN, E. K. 635.1/7
Growth and yields of cabbage, sprouting broccoli and tomato plants hardened by chemicals in nutrient solution and later grown at different levels of nitrogen, phosphorus and potassium.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 305-8.

The yields of cabbage, the seedlings of which were hardened by increasing the osmotic pressure by the use of K_2SO_4 and $CaCl_2$ in the nutrient solution, were superior to those of plants hardened by withholding nitrogen. In view of the

peculiar growth associated with such plants, however, the method cannot yet be recommended.—Columbus, Ohio.

211. WARE, L. M., AND JOHNSON, W. A. 631.8: 635.1/7
Effects of fertilizers, animal manures and green manures on the yield of vegetable crops on light garden soils.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 319-22.

A report of trials in cement bins at the University of Alabama, Auburn.

212. GRIFFITHS, A. E., KESWICK, R. C., AND FINCH, A. H. 631.8+631.531
A two-bed machine for the band-placement of fertilizer and the seeding of row crops on irrigated beds.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 336-40, bibl. 1.

A description of the apparatus and its operation. It is noted that specifications and a list of parts for the two-bed sled can be obtained from the Department of Horticulture, University of Arizona, Tucson, Ariz.

213. APP, F., AND WOLF, B. 635.1/7: 631.41
The influence of soil pH and organic matter upon the yields of some vegetable crops.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 309-13.

Observations at Bridgeton, N. Jersey, showed that crop yields of lima beans, peas, spinach and tomatoes are correlated with soil pH and organic matter. An organic matter content of at least 1.5% and a soil pH of 6.0 to 6.5 was most satisfactory. Otherwise fertilizers applied were not fully utilized.

214. FINCH, A. H., JONES, W. W., AND VAN HORN, C. W. 631.84: 635.1/7: 577.16
The influence of nitrogen nutrition upon the ascorbic acid content of several vegetable crops.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 314-8, bibl. 2.

Results of trials at the University of Arizona, Tucson, appear to support similar results on the effect of nitrogen on ascorbic acid content in grapefruit, in which an inverse nitrogen-ascorbic acid relation was found. In the arid south-west, where light intensity is high and apparently ample for photosynthesis, nitrogen seems to exert an important regulating effect on the ascorbic acid content of fruits and vegetables.

215. HANSEN, E. 635.1/7: 577.16+581.192
Seasonal variations in the mineral and vitamin content of certain green vegetable crops.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 299-303.

Examinations made in Western Oregon from August to April on the composition of fresh vegetables revealed the following:—Calcium was at its highest in August and September, decreased during the winter and rose slightly in the spring. Lime applied in December had little effect. Phosphorus content varied less and values tended to be higher in the winter than in autumn or spring. Hereditary rather than seasonal factors appeared to be particularly important in determining ascorbic acid content. Carotene in collards, kale and broccoli decreased considerably in the autumn and increased to a lesser extent in the spring. The plants on which the analyses were made were sprouting broccoli, chard, collards, kale and lettuce.

216. AKIMCEVA, S. R. 635.1/7: 631.62
The effect of drainage on vegetable crops. [Russian.]
Ovošćevodstvo (Vegetable growing), 1940, Nos. 11-12, pp. 29-30.

This article describes an experiment with tile drainage on

plots of light clay soil with heavy subsoil, very wet in spring, in the Leningrad province, to determine its effect on the yield, the crops being carrots, beetroot and cabbage. Work on the drained plots could be started about a fortnight earlier than on the undrained ground. The average increase in crop from drainage over that of control (undrained) plots for a 3-year period (1937-9) was carrots 22.2%, beetroot 19.9% and cabbage 37.9%.

217. NYLUND, R. E. 635.1/7: 631.536
The use of starter solutions in transplanting vegetable plants.
Minn. Hort., 1945, 73: 12-3.

A recent innovation is the use of dissolved fertilizers in the transplanting machine tank. The use of starter solutions has, in most instances, resulted in increased growth, earlier crops and larger total yields. A number of fertilizer mixtures have been tried and several have given good results. Several so-called plant hormones have been tried in starter solutions but without success. Various formulae for preparing starter solutions are given.

218. HOOVER, A. A., AND KARUNAIRATNAM, M. C. 635.3: 581.192
Oxalate content of some leafy green vegetables and its relation to oxaluria and calcium utilization.
Biochem. J., 1945, 39: 237-8, bibl. 11.

The calcium and oxalic acid contents are reported of 8 leafy vegetables important in Ceylon diet.—University of Ceylon, Colombo.

219. BLACK, L. M. 632.8
A virus tumor disease of plants.
Amer. J. Bot., 1945, 32: 408-15, bibl. 16.

The tumour produced by the virus *Aureogenus magnivena* on the roots of many susceptibles (ornamental, vegetables and common weeds) are described and figured. The overgrowths tended to be spherical and woody; depending on the species of suspect they ranged in size up to 1 cm. in diameter. Forty-three species of plants in 20 families were infected by the virus and it is believed that many more susceptibles remain to be discovered. It is suggested that the names wound-tumor disease and wound-tumor virus be used for the disease and for the pathogen respectively.

220. VANG, J. 632.4: 635.1/7
Typhula species on agricultural plants in Denmark.
Yearb. roy. vet. agric. Coll. Copenhagen 1945, pp. 1-46, bibl. 69.

The *Typhula* species are considered with regard to their incidence on the following plants:—cabbage, beet, grasses and clover.

221. VAN DEN MULZENBERG, E. W. B. 634.544
Overzicht van de historische ontwikkeling van den kassenbouw en de kasverwarming. (Review of the historical development of greenhouse construction and of greenhouse heating.)
Meded. Inst. TuinbTec. Wageningen 1, 1943, reprinted from *Meded. Inspect. Tuinb.*, 1943, pp. 505-15.

This is an historical survey of the construction and various measures for heating greenhouses from early times to the present day, with illustrations from old prints and recent photographs.

222. ANON. 631.544: 631.871
The use of straw in glasshouse soils.
Circ. Cheshunt exp. Res. Stat. 14, reprinted 1943, pp. 7.

This is a detailed account, supported by drawings, of different methods of applying wheat or oat straw to glasshouse tomato soil by inserting it in a vertical position in the soil, about 20 in. deep, at the rate of 6-8 or 9-12 tons per acre, according to whether one wall of straw on each side of the double row of tomato plants is used or whether a third wall

is formed in the narrow row also. The advantages of the treatment, which was tested by the Cheshunt Research Station Staff also on sick soils in the Worthing area, are convincingly explained. The subject is dealt with under the following headings:—Straw placed as vertical walls in the soil, straw walls as a means of watering the subsoil, use of chopped straw, cavings, straw waste, straw as a substitute for horse manure.

223. VAN DEN BRANDE, J. 632.77: 632.96
Een belangrijke parasiet (*Encarsia formosa* Gahan) van de Witte Motjes (*Trialeurodes vaporariorum* Ww.). (An important parasite of the white fly.)
Cultuur Hand., 1940, 8: 168-70.

The white fly and its parasite are described and illustrated with original sketches. Successful results were obtained when the parasite was introduced into cucumber houses infected with white fly, and it was observed in great numbers in water-cultures of tomatoes under glass. Insecticides were found to have a lethal effect on the parasite and in trials 27% to 70% were killed in the white fly scales.

224. ANON. 632.6/7
Insect pests. Notes contributed by the Entomological branch.
Agric. Gaz. N.S.W., 1945, 56: 353-5.

Descriptions of the stages of development and measures for control are given for the tomato caterpillar (*Heliothis armigera*), the vegetable weevil (*Listroderus obliquus*) and the grape-vine moth (*Phalaenoides glycine*).

225. ANON. 632.6/7
Insect pests. Notes contributed by the Entomological Branch.
Agric. Gaz. N.S.W., 1945, 56: 499-502.

Brief descriptions, with measures for control, of red spider (*Tetranychus urticae*), springtails (*Collembola*) and the harlequin bug (*Dindymus versicolor*), and a note of variety susceptibility of carrots to carrot aphids (*Cavariella* spp.).

226. WALLACE, C. R. 635.1/7: 632.76
The black beetle (*Heteronychus sanctaehelanae*) as it affects coastal vegetable growers and horticulturists.
Agric. Gaz. N.S.W., 1945, 56: 339-42, bibl. 5.

This scarab beetle of South African origin has been a major pest in coastal New South Wales since 1930. It is destructive to maize, transplants of tomatoes, cabbages and cauliflowers, certain plants used for cut flowers and other crops. In a typical case of black beetle damage the plant wilts, collapses and dies. Occasionally a wilted or collapsed plant may recover, though growth is often stunted by the damage inflicted. The beetle (adult about $\frac{1}{2}$ inch long) is described and figured. Where it is prevalent the headlands should be kept free of grass and weeds; tomatoes should not be grown as a ground crop, but should be staked or trellised to avoid possible destruction of fruit resting on the ground. Hand-picking and the use of unpoisoned baits are described as remedial measures. Sugar-cane stalks, sawn into 10- or 11-inch lengths, split into halves longitudinally, and placed on the ground with the flat surface downwards, are excellent baits. In recent field experiments DDT-prophylite dust when mixed with the soil gave good protection for young cauliflower and marigold plants.

227. VAN DEN BRANDE, J. 632.752
Onze Pseudococcus-soorten en hun bestrijding. (Dutch species of *Pseudococcus* and their control.)
Meded. LandbHoogesch. Opzoek. Stat. Staat. Gent, 1940, 8: 197-202.

Control measures have been tried against mealybugs in glasshouses. White oil emulsions (Volck) were very effective at 2% when applied four times. Nicotine at 2% also gave good results when made up with 2% soap and 0.5% Na_2CO_3 and applied three times. Immersing plants

in Volck 2% killed 95% mealybugs. Fumigation with hydrocyanic acid gave satisfactory results only at dosage of 2 g. per m³. Nicotine fumigated at the usual dosage was not effective. Absolute alcohol applied with a brush was very effective.

228. SOBOLEVA, V. P. 635.1/7: 631.531.17
Disinfecting the seed of vegetable crops. [Russian.]
Ovoševodstvo (Vegetable growing), 1940, No. 2, pp. 26-7.

Experiments are described with tabulated results on the disinfection of seed against the diseases black rot of carrot (*Alternaria radicina*), vascular bacteriosis of cabbage (*Bacterium campestris*), and bacterial canker of tomato (*Corynebacterium michiganense*). The substances used were sublimate (mercuric chloride), formalin, permanganate of potash, and two others. Results are discussed.

229. WIESMANN, R. 635.1/7: 632.951
Die Verwendung der Arsenersatzstoffe im Gemüsebau. (The application of DDT in vegetable growing.)
ForschErgebn. Geb. Gartenb., 1943, H.4, pp. 24-48.

The applicability of Gesarol (DDT) to vegetable growing was tested at Wädenswil by comparing the value of the new insecticide with that of derris and nicotine against a number of important vegetable pests. Whereas Gesarol showed no advantage over the standard non-arsenic preparation in the case of the cabbage stem flea beetle, the cabbage moth, *Contarinia torquens* and a pest of peas, it proved distinctly superior to derris and somewhat better than nicotine in the control of the leek pest *Acreolepia ascellata*, and it was a great success against the onion fly, which so far has enjoyed an almost control-proof existence. It is hoped that a better understanding of the biology of this pest will further improve the results.

230. GRANOVSKY, A. A. 632.951
DDT as a horticultural insecticide.
Minn. Hort., 1945, 73: 52-3, 55.

In experiments carried out at the Minnesota Agricultural Experiment Station DDT was found to be effective against the Colorado beetle, leafhoppers and fleabeetles of potatoes, leafhoppers of carrots, the imported cabbage worm, the cabbage looper, the caterpillar of the diamond back moth, and squash bugs of cucurbits. Preliminary tests gave every indication that DDT will be successful against spotted cucumber beetles and onion thrips.

231. WIESMANN, R. 631.462: 632.951
Das "Gesarol" als Bodendesinfektionsmittel. (Gesarol [DDT] as a soil disinfectant.)
ForschErgebn. Geb. Gartenb., 1943, H.3, pp. 3-47.

A Gesarol [DDT] emulsion, originally intended as a special insecticide for aphids, was found to possess almost all the requirements which go to make the ideal soil disinfectant, and was thereupon named Gesapon by the manufacturing firm, Geigy of Basle. Extensive trials at Wädenswil involving the control of carrot fly, cabbage fly, wireworms and stem eelworm of onions showed that in each case a single application at specified rates and concentrations gave most satisfactory results. The new chemical is non-toxic to plants and to the soil, it has a residual effect for a very long period and is simple to apply. It may, therefore, be expected to play an important part in vegetable growing, especially if it can be produced more cheaply.

232. LLOYD, N. C. 632.951
D.D.T. as an insecticide. Results of preliminary trials.
Agric. Gaz. N.S.W., 1945, 56: 347-8.

Successful results are here recorded with DDT against the potato moth (*Gnorimoschema operculella*) and the Rutherglen bug (*Nysius vinitor*).

233. PASFIELD, G. 632.951
D.D.T. as an insecticide. Results of preliminary trials.

Agric. Gaz. N.S.W., 1945, 56: 455-6, 467.

An account of further trials with DDT (see 232). Promising results were obtained against the following pests: cabbage moth (*Plutella maculipennis*), cabbage white butterfly (*Pieris rapae*) and the slaty grey aphid (*Brevicoryne brassicae*); onion thrips (*Thrips tabaci*); rhubarb dink bug (*Dicyphus* sp.); Rutherglen bug (*Nysius vinitor*) on silver beet; tomato jassid (*Empoasca* sp.); wheat aphid (*Rhopalosiphum pruni-foliae*); green peach aphid (*Myzus persicae*); gladiolus thrips (*Taeniothrips simplex*); bean weevil (*Bruchus obtectus*); grain weevils (*Calandra oryzae* and *C. granaria*); and the Queensland fly (*Strumeta tryoni*). Details are given of the application in each case. It was ineffective against the bean red spider (*Tetranychus urticae*). DDT as applied inhibited the early development of the tomato mite (*Phyllocoptes lycopersici*) but could not be regarded as giving a satisfactory measure of control.

234. WALLACE, C. R. 635.1/7: 632.76
D.D.T. as a soil dressing against black beetle.
Agric. Gaz. N.S.W., 1945, 56: 186.

From laboratory experiments the writer concluded that DDT was remarkably repellent and toxic to adults of the black beetle (*Heteronychus sanctaehelenae*) even when the chemical was mixed with more than 1,000 times its weight of soil, so field experiments were conducted in February and March, 1945, with crops of cauliflowers and marigolds on two large farms where the beetles were abundant and destructive at the time. A mixture of soil and dust containing DDT was put in the holes with the seedlings at planting time. The untreated plants became badly damaged; in the treated series normal damage was either absent or insignificant.

235. HADORN, C. 631.462
Bodendesinfektionsversuche im Treibbeet und Freiland. (Soil disinfection trials in frames and in the open.)
ForschErgebn. Geb. Gartenb., 1943, H.3, pp. 48-63.

Soil treatment with formalin is described. The following optimum dosages and minimum waiting periods were ascertained:—for heaped soil 20 litres of 1% formalin per m² of soil, to be applied in layers. Area treatment:—10 litres per m². The waiting period necessary after treatment was 2 to 3 weeks, but frequent digging may reduce this period to 8 days, which represents a minimum.—Wädenswil Research Station.

236. LACHMAN, W. H. 635.1/7: 632.954
Some notes on the mechanics of applying selective herbicides to vegetable crops.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 323-8, bibl. 14.

Greater care must be exercised in applying weed sprays than when applying insecticides and fungicides. Almost any type of spray rig may be adapted to the application of selective herbicides, but special nozzles that deliver flat fan sprays are necessary for best results. Particular attention should be given to the calibration of the tractor speed with the amount of spray delivered per unit of time. [Author's summary.]—Amherst, Mass.

237. REINMUTH, E. 632.42
Untersuchungen über die Kohlherniebekämpfung durch Kalk. (Clubroot control by liming.)
Angew. Bot., 1943, 25: 368-78, bibl. 7.

The effect of quicklime applications on the development of clubroot was studied from 1937 to 1942, *Sinapis alba* and *Camelina sativa* serving as test plants. Early applications (30 November-4 December) to crops susceptible to *Plasmadiophora* were found to give better results than later applications. If desirable, liming may be carried out in time to benefit the preceding crop in the rotation without prejudice

to clubroot control. The threshold value below which alkalinity must not be allowed to go was shown to be pH 8.2 to 8.4.—Agricultural Research Station, Rostock.

238. WOOD, E. J. F. 582.6
The sources of agar in Australia.
J. Coun. sci. industr. Res. Aust., 1945, 18: 263-72, bibl. 6.

The present knowledge concerning the location and general habits of agar-producing seaweeds in Australia is summarized and the harvesting and manufacture of *Gracilaria confervoides* are described.

239. POPOV, A. M. 633.378-1.58(47)
The Tangier pea (*Lathyrus tingitanus* L.) and the prospects of its cultivation in U.S.S.R. [Russian.]
Vest. Soc. Rast. (Soviet Plant Industry Record), 1941, No. 1, pp. 112-25.

The Tangier pea is an annual plant producing a large bulk of foliage rich in protein and containing 123-55 mg.% of vitamin C. It can withstand drought and cold, being able to grow even in poor sandy soils and survive a temperature of -7°C . It can be cultivated not only in the semi-tropical regions of the U.S.S.R. but as far north as Leningrad, where it is not prevented from forming seed. In the northern latitudes, however, it cannot be sown in autumn, but elsewhere it survives the winter, and may also be sown in spring and summer. The ample yield of foliage, between 30 and 40 tons per ha., makes the Tangier pea an excellent green manure, for it not only smothers weeds, but also contributes to the soil between 214 and 286 kg. of nitrogen per hectare. In the steppe regions, where it also serves the purpose of trapping snow, the pea has been successfully grown as a catch crop.

240. RATERA, E. L. 633.491
Ensayo de variedades cultivadas de *Solanum andigenum* Juz. et Buk., en la Facultad de Agronomía y Veterinaria de Buenos Aires. (Trials with cultivated varieties of *Solanum andigenum* Juz. et Buk., in the Faculty of Agriculture and Veterinary science of Buenos Aires.)
Rev. Fac. Agron. B. Aires, 1944, 11: 63-77, bibl. 19.

The species of *Solanum andigenum* is supposed by some authorities to be one of the sources of the cultivated forms of potato. The paper describes observations on 43 varieties of this species, chiefly with regard to their yield and relation to certain diseases and pests.

241. BAZAVLUK, V. (BAZAVLUK). 633.491-1.532.1
Conditions of storage, and their influence on the healing of the cut crowns of potato tubers. [Russian.]
Proc. Lenin. Acad. agric. Sci., 1944, No. 11-12, pp. 30-8.

From dormant tubers, the crowns should be sliced off with a sharp, disinfected knife, and covered with moist earth without delay. They must be kept thus for 10 to 15 days at a temperature of 10° to 18°C . Under these conditions, it has been found that a protective layer of cells is formed over the cut surface in the shortest possible time. Low temperature, dryness, and insufficient access of air hinder this process. Crowns cut from sprouted tubers should be placed with the cut surface downwards on the soil, but not covered. Both healing and vernalization will then take place. The article described in detail the results of the microscopic examination of the healing process over the cut surface.

242. ZYKOVA, E. A. 633.491-1.532.1
Potato-planting without tubers, and how to obtain high yields of potatoes from individual holdings. [Russian.]
Proc. Sci. Conf. Timirjazev Agric. Acad. 3-10 June, 1944, 1945, No. 1, pp. 22-3.

The method is not described in detail, but it may be gathered

that plants are grown from the eyes. Eight or nine days after setting the shoots are earthed up, being covered with soil; and this is repeated 5 or 6 days later. After yet another 5 or 6 days they are earthed up (but not covered) for a third time. Thus, at three levels along the stem there are points from which stolons will issue. Between 25 and 50 tubers (1.5 to 4 kg.) are formed by each plant.

243. LISOVA, A. V. 633.491-1.532.1
Planting potatoes without tubers, and thinning out the plants in order to increase the yield. [Russian.]
Proc. Sci. Conf. Timirjazev Agric. Acad. 3-10 June, 1944, 1945, No. 1, p. 24.

Large, healthy tubers are chosen, and their eyes cut out. The plants grown from these eyes are planted out at the rate of 80,000 per hectare. Two crops of tubers can be obtained in a year, the first when the plants are thinned out in summer, the second in autumn. The additional yield has increased the total output per hectare by between 23% and 42%.

244. MARTENSEN, E. 633.491-1.532.1
The storage and utilisation of potato crowns obtained from crops planted in summer. [Russian.]
Proc. Lenin Acad. agric. Sci., 1945, No. 3, pp. 41-3.

The conditions described in this article are those of the lowlands of Azerbaïdžan. The crowns were cut from the tubers during the period between 23 December and 1 January. After drying a little, they were stored in boxes which were kept in barns, cellars, and cold glasshouses. Some boxes contained soil, others sand, and others slices only. Soil was the best storage medium. It was also found possible not to store but to plant the crown slices direct in the soil during the months of December to March.

245. MARTÍNEZ CROVETTO, R. 633.491-2.5
Las malezas del cultivo de papa en el sudeste de la provincia de Buenos Aires. (The weeds in potato fields in the south-east of the province of Buenos Aires.)
Rev. argent. Agron., B. Aires, 1944, 11: 205-32.

This article starts with a general account of the weeds and of the types of damage they cause in the potato fields of Buenos Aires: it continues with a brief description, for identification, of each of the more important weeds (73 in all) and suggests measures for controlling them economically and effectively.

246. COOK, W. M. P. 633.52
The effect of flax straw maturity on the microscopic structure and dimensions of the ultimate fibres.
J. Coun. sci. industr. Res. Aust., 1945, 18: 225-30, bibl. 4.

Fibres of the best spinning quality were produced by flax straw harvested between 16 and 30 October (Australia) from the stage when flowering was complete and the stems turned yellow to the stage when the seed bolls began to change colour. As fibre size increased further with maturity spinning quality decreased. Possibly, the effect of straw maturity may be partly overcome by heavier seeding rates. In the appendix, a fibre microtome is described and illustrated which has been specially designed for the study of the microscopic structure of flax.

247. MACHACEK, J. E., AND BROWN, A. M. 633.52-1.56
Threshing-injury to flax seed in Canada.
Sci. Agric., 1945, 25: 601-25, bibl. 7.

In Canada flax seed is often fractured when threshed during dry weather. The fractures are generally minute and invisible to the naked eye and so do not affect the market grade of the seed. When fractured flax kernels are planted in ordinary soil, many of them rot as a result of invasion by soil-borne micro-organisms. Such decay can be prevented by applying to the seed a suitable disinfectant. In heavy soils New Improved Cerasan at $1\frac{1}{2}$ oz. per bushel gave the best result.

248. STRAIB, W. 633.52-2.44
Untersuchungen über die Rostresistenz des Flachs. (The rust resistance of flax.) *Faserforsch.*, 1941, 15: 97-113, from abstract *Zbl. Bakt.*, Abt. II, 1944, 106: 314.
The rust (*Melampsora lini*) resistance of leaves and stem in a number of flax varieties is discussed. While as a rule leaf-susceptible varieties are also stem-susceptible, some show a high degree of stem resistance. Several varieties of the latter type are named, which are suitable for fibre production. Climatic conditions were found to affect susceptibility. The relative resistance of stem and leaves was shown to vary according to the strain of rust used.
249. COLHOUN, J. 633.52-2.44: 546.27
The effect of boron on the development of flax rust. *Gdnrs' Chron.*, 1945, 118: 171, bibl. 5.
Field and greenhouse experiments, carried out for two seasons at the Agricultural Research Institute, Hillsborough, Northern Ireland, confirmed the results of American workers that boron application to the soil did not affect the development of flax rust, caused by *Melampsora lini*.
250. MUSKETT, A. E., and COLHOUN, J. 633.52-2.4
Control of foot rot (*Phoma* sp.) of flax. *Nature*, 1945, 156: 538-9, bib. 1.
As a result of earlier experiments (*ibid.*, 1945, 155: 367-8; *H.A.*, 15: 628) the disinfection of flax seed with New Improved Ceresan at the rate of 12 oz. per cwt. was recommended. Later trials show that the treatment is harmless only if applied to seed with a moisture content of less than 10%. Under good storage conditions sowing should not be delayed for more than 8 weeks after treatment.—Ministry of Agriculture (N.I.) at Queen's University, Belfast.
251. RUSCHMANN, G., and BARTRAM, H. 633.52-2.3/4
Weitere Untersuchungen über den Verderb von Flachsfasern und Leinengarnen durch bakterielle und pilzliche Schädlinge. (Further investigations on the spoilage of flax fibres and yarns by bacteria and fungi.) *Bastfaser*, 1943, H.3/4, pp. 29-39, from abstract *Zbl. Bakt.*, Abt. II, 1944, 106: 393.
Alternaria tenuis, *Cladosporium herbarum* and *Mucor plumbeus* were found to occur widely on flax stems and to cause considerable damage.
252. BLACK, C. A. 633.522-1.8
Effect of commercial fertilizers on sex expression of hemp. *Bot. Gaz.*, 1945, 107: 114-20, bibl. 10.
In 8 field experiments differences in sex ratios due to different amounts of N, P and K supplied were small.—Iowa State College, Ames.
253. KANISKIN, M. F. 633.522
Hemp investigations at the Penza Experimental Station. [Russian.] *Bull. Inst. Grain Husb. S.E. SSR.*, 3, 1945, pp. 21-8.
Hemp growing has been studied in earnest since the Revolution in Russia and as a result certain conclusions on manuring, soil, rotations, and other matters connected with the crop have been reached, which are touched on very briefly here. It was found, for example, that clover is a suitable crop to precede hemp, and that heavy dressings of dung and complete fertilizer are usually necessary. At the present time, plant breeders are searching for hems from which a variety capable of yielding both fibre and seed can be bred.
254. NELSON, E. G., and DEXTER, S. T. 633.527
Fiber from the stems of common and swamp milkweeds. *Quart. Bull. Mich. agric. Exp. Stat.*, 1945, 28: 20-6.
Experimental results show that fibres from *Asclepias syriaca* and *A. incarnata* stems cannot compete with flax or hemp fibres.
255. ALCARAZ MIRA, E., and IZQUIERDO TAMAYO, A. 633.71: 547.944.6
Obtención de plantas tetraploides de *N. rustica* and *N. tabacum* mediante la colchicina. (The production of tetraploid plants of *Nicotiana rustica* and *N. tabacum* by the use of colchicine.) *Bol. Inst. nac. Invest. agron. Madrid*, 1944, No. 11, pp. 49-87, bibl. 42.
Tetraploid plants of *Nicotiana rustica* var. *Hemelowke* and of *N. tabacum* var. *Hybrid 196-A* (Valencia \times Round tip) have been obtained by soaking the seeds in 0.2% and 0.5% colchicine solutions. Their tetraploid characteristics have been verified by cytological study and by chromosome counts. Their morphological characters show a tendency to gigantism, their stomata, flowers, anthers, stigmas, pollen grains, and cells in general being larger. Their fertility is low, but they yielded larger and darker seed than that of the normal plants. This seed produced tetraploid plants with similar morphological and cytological characters, and also with low fertility. The tetraploid descendants of *N. rustica* contain as much as 25% more nicotine than diploid plants grown under similar conditions.
256. BEST, R. J. 581.192: 633.71
Studies on a fluorescent substance present in plants. 2. Isolation of the substance in a pure state and its identification as 6-methoxy-7-hydroxy 1:2 benzo-pyrene. *Aust. J. exp. Biol. med. Sci.*, 1944, 22: 251-5, bibl. 10.
The substance was found to accumulate in the roots of young decapitated tobacco plants inoculated with tomato spotted wilt virus, but it was shown to be present also in healthy plants.—Waite Agricultural Research Institute, Adelaide.
257. SALMON, E. S. 633.79
Twenty-sixth report on the trial of new varieties of hops, 1942, 1943, pp. 16, 6d.
Twenty-seventh report on the trial of new varieties of hops, 1943, 1944, pp. 16, 6d.
Twenty-eighth report on the trial of new varieties of hops, 1944, 1945, pp. 13, 6d.
Published by East Malling Res. Stat., Maidstone, Kent.
The 3 reports present the results of the current years under the following headings:—Actual estimated yields; number of bushels required to the cwt.; the resin contents; general summary. In addition, the 26th and 27th reports deal with the Hops Marketing Board and the valuation of the new varieties of hops, while the 27th and 28th reports discuss also the call by brewers for the new varieties and the need for an increased acreage and brewing trials with the new varieties. The 28th report devotes two further chapters to the keeping properties of hops and to the Challenge Cup for new (Wye) varieties of hops. The varieties tested each year numbered 101, 118 and 131 respectively. The discussion of the results includes the following points: (1) The average yield per acre of Brewer's Gold over 16 years at East Malling Research Station in 1944 stood at 25½ cwt., and of Bullion Hop over 10 years at 26 cwt. (2) It has been shown that both Bullion Hop and Brewer's Gold belong to the "One-bine" class, and it is strongly recommended that they are grown commercially in this way. (3) For 10 consecutive seasons OM26, a bud sport of the Nonsuch Hop (OB53), has proved to be richer in soft resins than its parent. It is suggested that similar bud sports should be sought in other commercial varieties. (4) The reluctance of growers to plant the new varieties in spite of increased demand by brewers is explained by the failure of the Hops Marketing Board to fix a higher price for them in accordance with their higher brewing value. (5) In order to satisfy the requirements of brewers, who have undertaken to buy

annually some 6,000 cwt. of certain of the new varieties, the existing acreage would have to be considerably increased. In this connexion it is urged that an experimental station should be established in the Weald of Kent, where the approved new varieties could be tried out on Fuggle soil. (6) It has been shown that two of the new varieties, Northern Brewer and John Ford Hop, have exceptional keeping qualities and it is considered likely that in due course they will replace the Golding varieties Cobb's and Tutsham.

258. KÖRTING, A. 633.85-2.111
Über die Auswirkung von Winterschäden am Wurzelsystem des Rapses auf das weitere Gedeihen der Pflanze. (The effect of winter injuries to the root system of rape on the growth of the plant in the following season.)

Angew. Bot., 1943, 25: 339-49, bibl. 5.

The principal result of this preliminary investigation is the observation that rape is capable of yielding a considerable crop in spite of relatively heavy frost damage to the roots in the preceding winter.—Aschersleben Branch of the Biologische Reichsanstalt.

259. FREY, W. 632.951: 633.85
"Gesarol-Staub", ein neues chemisches Mittel gegen den Rapsglanzkäfer. (Gesarol dust, a new chemical for the control of the rape pest *Meligethes aeneus*.)
Mitt. Landwirtsch., 1944, 29: 235-6, from abstract Zbl. Bakt., Abt. II, 1944, 106: 496.

In field trials Gesarol dust, applied at the rate of 7.7 kg., 10.5 kg. and 11.3 kg. per hectare, effected a 95% kill of the rape pest *Meligethes aeneus* within one day. In laboratory tests an almost 100% success within 2 days was achieved following the application of 5 kg./hectare. The residual effect of Gesarol proved to be superior to that of low-per cent. derris dusts.

260. VAN GODTSENHOVEN, E. 633.88
Teelt der geneskrachtige planten. Verslag over de proefvelden op Valeriaan (*Valeriana officinalis* L.) en Kamillebloemen (*Anthemis nobilis* L.) in 1940 aangelegd. (Report on cultivation experiments with the medicinal plants valerian and camomile in 1940.)
Meded. Landb.Hoogeschool. Opzoek. Stat. Staat Gent, 1940, 8: 131-53.

In experiments on the influence of hormones applied to the roots of young plants of a heterogeneous population of *Valeriana officinalis* L., at the time of transplanting, results were inconclusive. In comparative trials of chemical and organic manures applied to valerian and camomile the complete N-P-K-Ca-Mg fertilizer gave the biggest yields in valerian roots and camomile flowers. The morphological and chemical analysis of the products showed not only that the increase of yields obtained by the chemical fertilizers had no harmful influence on the quality of the product, but that the valerian roots and camomile flowers were superior to those of plants receiving organic manures in normal large quantities. The writer thinks that organic manures must remain the basic fertilizers but that they must be supplemented with a complete chemical fertilizer, N-P-K-Ca-Mg. [From author's summary.]

261. CLAASSEN, C. E., AND KIESSELBACH, T. A. 633.854.797
Experiments with safflower in Western Nebraska.
Bull. Neb. agric. Exp. Stat. 376, 1945, pp. 28, bibl. 14.

Safflower (*Carthamus tinctorius*) has maintained its importance as an oilseed crop in the semi-arid regions of India, Egypt, Iran and in some other countries after synthetic dyestuffs have displaced it as a source of red dye. The oil has about the same value and similar uses as linseed oil.

The prevailing great demand for dyeing oils and high-protein feed supplements, provided in the oil cake, has stimulated an experimental study of the crop under the conditions of western Nebraska. There, safflower was found to thrive at an elevation of 3,000 feet or more, in an atmosphere which is hot and dry during flowering time, in conjunction with a favourable moisture supply from the subsoil throughout the growing season. The high yielding varieties available at present have the disadvantage of remaining in the rosette stage for a long time, thus being incapable of competing with weeds. Drilling in cultivated rows, at the rate of 12-28 lb. per acre on dry land and of 40-50 lb. on irrigated soil, is recommended. Planting dates are recommended for both dry land and irrigated land. Although there is little difference in seed yield between varieties of different origin, the oil content was found to vary markedly. Extensive tests have led to the recommendation of Pusa No. 7, Ahmednager No. 1 and Simla, but it is thought that considerable improvement could be achieved after a relatively short period of systematic breeding. Future developments will show whether safflower can be established as a profitable commercial crop in western Nebraska.

262. KRÜGER, E. 633.854.54-2.4
Untersuchungen über zwei der bedeutendsten Leinparasiten—*Colletotrichum lini* Manns et Bolley und *Septoria linicola* (Speg.) Gar. (*Sphaerella linorum* Wr.). (A study of the important linseed parasites *Colletotrichum lini* and *Septoria linicola*.)
Arb. biol. Reichsanst., 1941, 23: 168-88, from abstract Zbl. Bakt., Abt. II, 1944, 106: 316.

The two fungi, which were studied morphologically and physiologically, are of great economic importance in Germany. Apart from seed disinfection, breeding for resistance seems promising.

263. STRAUGHAN, W. R. 633.854.78
Sunflowers for seed.
Qd agric. J., 1945, 61: 5-7.

In Australia the sunflower is grown almost exclusively for seed, which is one of the principal ingredients in some commercial bird seed mixtures. Under normal conditions it is a gross feeder and best results are obtained on deep, rich, friable loams. Hints are given on cultivation, sowing, harvesting and seed selection.

264. VAN DEN BRANDE, F. 633.83
De teelt van specerij of toekruiden. (The cultivation of spice plants.)
Cultuur Hand., 1942, 10: 6-7.

Brief notes on the uses and cultivation of angelica (*Angelica archangelica* L.), thyme (*Thymus vulgaris* L.), tarragon (*Artemisia dracunculus*), garlic, shallots, chervil, parsley, savoury (*Satureia* spp.), and nasturtium (*Tropaeolum*).

265. ROSSĖSKIĬ, D. M. 633.88(47)
Medicinal plants in the U.S.S.R., and their uses. [Russian.]
1944, 119 pp., 3 roubles, Moscow, from review Sovetsk. Botan., 1944, 12: 6:85-7.

The author of the book is described as the outstanding specialist in this sphere. The book is highly recommended to the medical profession.

266. REVERDATTO, V. V. 633.88(47)
New medicinal plants of the U.S.S.R. [Russian.]
Sovetsk. Botan., 1944, 12: 6:81-2.

The following species are briefly discussed: *Scutellaria baicalensis*—a sedative having a stronger effect than *Leonurus*; *Stellera chamaejasme*—a laxative; several species of *Bupleurum*—having an effect on the liver and gall bladder, and similar to *Helichrysum arenarium*.

267. VOROŠILOV, V. N. (VOROSHILOV). 633.88
Notes on the systematics of the aconite species
in the flora of the U.S.S.R. [Russian.]
J. Bot. U.R.S.S., 1945, No. 3, Vol. 30, pp. 125-43.
Some species of aconite are valuable for medicinal, insecticidal and antiodent purposes. About 80 species were therefore carefully examined. The article contains descriptions of morphological and other characters; the alkaloidal properties were studied in relation to the classification of the species, in order that some idea could be gained as to which species are likely to possess useful properties.
268. HILLS, K. L. 633.88.844-1.535
A note on vegetative propagation and tree form
in *Duboisia* spp.
J. Coun. sci. industr. Res. Aust., 1945, 18: 230-3.
(I) *Duboisia myoporoides* and *D. leichhardtii* may be propagated vegetatively by means of softwood tip cuttings.
(II) Differences in form between young trees of *D. leichhardtii* observed at Canberra are maintained in their vegetative progeny. [Author's conclusions.]
269. HILLS, K. L., TRAUTNER, E. M., AND RODWELL, C. N. 633.88.844
A preliminary report upon variation in the nature and quantity of the main alkaloids in *Duboisia myoporoides* and *Duboisia leichhardtii*.
J. Coun. sci. industr. Res. Aust., 1945, 18: 234-53, bibl. 10.
The extent and nature of the variation in the alkaloids of *Duboisia myoporoides* and of *D. leichhardtii* have been investigated by examining 82 samples of leaf collected from individual trees scattered throughout the known distribution areas of the species. Although considerable variation, both in quantity and nature of alkaloids, may occur from time to time in individual trees, the balance, on the average, favours hyoscyne in the northern section of *D. myoporoides*, and hyoscyamine in *D. leichhardtii* and the southern area of *D. myoporoides* in plantation material. The average composition of both species throughout the year was much the same as that of natural stands. The assay method used, which has several novel features, is described. [From authors' summary.]—Joint project of the Division of Plant Industry and the University of Melbourne.
270. KROTKOV, G. 633.913
A review of literature on *Taraxacum kok-saghyz* Rod.
Bot. Rev., 1945, 11: 417-61, bibl. 235.
In this review the writer discusses the literature on kok saghyz under the following headings: Introduction, discovery and biology of kok saghyz, anatomy, physiology and biochemistry, analytical methods for determination of rubber, cultivation, pathology, selection and technology. He summarizes as follows:—"Kok-saghyz is reported to be one of the most promising rubber plants which have been found within the last few years. It was discovered in 1931 in the central Asiatic regions of U.S.S.R., close to the Chinese border. Being in cultivation only for the last 12 years it is still fairly close to its original wild type, and its improved forms are just beginning to appear. This fact, together with its great demands for labour and the absence of specially designed machinery, represent the greatest difficulties in its present day cultivation. It is, however, a plant which seems to have considerable biological potentialities, and it responds greatly to the improved conditions of cultivation. It contains rubber in its roots, and the recent tendency in its cultivation is to grow it either as an annual or a biennial, depending whether one wishes mainly its roots or seeds. As a source of rubber it is sown usually in the spring and its roots are dug up late in the fall of the same year. As a source primarily of seeds, a plantation is left for the second year. Seeds are collected by the middle of the second season of growth, and roots are dug up shortly after the peak of seed production has been reached. Extraction of rubber from kok-saghyz roots does not present any serious difficulties. Since its roots contain up to 27-89% of their weight as rubber, the main interest in this plant so far has been as a source of rubber. It should be remembered, however, that up to 40% of its dry roots is in the form of an easily hydrolyzable polysaccharide which can be fermented, and for this reason kok-saghyz may serve also as a raw material for the alcohol industry."
271. JAMINEVA, S. 633.913
Our experience of growing kok saghyz. [Russian.]
Kolhoznoe Proizvodstvo (Collective farming), 1944, No. 8-9, p. 32.
This is a brief account of the methods used to get good yields of kok saghyz on black earth soil at a collective farm in the Baškiri Autonomous S.S.R. Sowing is done in October-November on the bare fallow ploughed to a depth of 25 cm. with a simultaneous application of 35 to 40 tons of farmyard manure per ha. The seeds are planted at a depth of 1 to 1.5 cm. and covered with a layer of compost 1 cm. thick. Frequent cultivation weeding of the crops and loosening of the soil is carried out throughout the vegetative period. In 1943 a yield of 35 centners of roots and 70 kg. of seeds per ha. was obtained.
272. BANNAN, M. W. 633.913
Tetraploid *Taraxacum kok-saghyz*. I. Characters of the leaves and inflorescences in the parental colchicine-induced generation.
Canad. J. Res., 1945, 23, Sec. C, pp. 131-43, bibl. 23.
Seedlings of kok saghyz at different stages of development were treated with colchicine. Successive selections yielded a few hundred plants with tetraploid crowns: they bore fewer, broader leaves and fewer, bigger inflorescences with larger achenes than did selected large-celled diploids given the same treatment, but in general the plants were no bigger.
273. BOBKOV, E., AND PANOVA, E. 631.811.956: 631.411.4
The influence of large doses of copper on the development of plants growing on peaty soils. [Russian.]
Proc. Lenin. Acad. agric. Sci., 1945, No. 3, pp. 12-5.
In experiments with *Taraxacum kok-saghyz*, *Avena sativa* and *Hordeum vulgare* grown on a peaty soil, to which various amounts of copper were added, the yields of all the crops were increased. Kok-saghyz was the first to suffer a set-back as the amounts increased; the other crops tolerated much more. The content of copper in the plants did not increase so rapidly as that in the soil. It is therefore believed that the organic substances of the soil immobilize much of the copper. The exact nature of this immobilization, however, remains obscure; for whereas only 2 or 3 mg. of copper per kg. of soil are sufficient to ensure normal growth in soil which, without copper, would produce no growth at all, many hundreds of mg. can be added without harm to the plant.
274. DROBKOV, A. A. 633.913: 581.192
Accumulation of rubber in kok saghyz at different periods of its life.
C.R. Acad. Sci. U.R.S.S., 1945, 47: 363-5, bibl. 4.
It was the chief object of this investigation to determine the most favourable time for harvesting kok saghyz. The author found that in the second spring, when the rosette is fully developed, highest rubber content in the plant coincides with highest yields per unit area. Harvesting of 2-year-old roots at the end of July is recommended only for plants grown for seed or in the case of an under-developed crop. Rubber is regarded as a reserve nutrient material, which is consumed and therefore decreases in the roots towards the beginning of the growing period and during fructification. Towards the beginning of winter a sharp

drop in carbohydrates is accompanied by an increase in rubber content in the roots due to the conversion, in the first place of inulin, into rubber under the action of freezing temperatures in the soil.—W.I. Vernadsky Laboratory of Geochemical Problems.

275. KOJALOVICH, N. B., AND JAKIMOV, P. A. 633.913-1.56

The extraction of rubber from the roots of kok saghyz by mechanical means. [Russian.]
Vest. Soc. Rast. (Soviet Plant Industry Record), 1941, No. 1, pp. 95-8.

The apparatus for extraction is simple enough to be used on any farm growing kok saghyz. It consists of a stout oak barrel, of 70 litre capacity, mounted on an axle which allows it to be revolved. It is partly filled with pot balls or even flints. About 8 kg. of roots, which have been washed, dried to coagulate the rubber, minced, and soaked in water, are then introduced, and it is revolved at the rate of 45 revolutions a minute, with the expenditure of no more than 0.27 kw. of electrical energy. The grinding may last from 6 to 16 hours. The rubber is separated from the sludge by means of sieves and washing with water. Alcohol may be obtained by fermenting the slime. No chemicals or centrifuging are required; and 95% of the rubber is extracted.

276. PERVUHINA, N. V. 581.143.5: 633.913

Investigations into the processes of callus formation. [Russian.]
Sovetsk. Botan., 1945, 13: 2: 51-60.

The formation of callus tissue in the roots of kok saghyz and the stems of a wild rose was examined microscopically. It is shown that, in kok saghyz, the tissue arises from the cambium and in the *Rosa* sp. from both the cambium and the pericycle; and that it is anatomically differentiated.

277. KLECHETOV, A. N. 633.913-2.3

A new bacterium on the rubber-plant tau-saghyz.
C.R. Acad. Sci. U.R.S.S., 1945, 47: 377-8, bibl. 2.

Tau saghyz was found to grow in sand and water cultures without addition of nitrogen, the reduction in yield as compared with controls grown with a complete fertilizer being 44.4% only (compared with peas 82.5%). Microtome sections revealed the presence of a spherical bacterium in the roots, peduncle, leaves, heads and seeds of perfectly healthy tau saghyz plants, but the organism is particularly abundant in the tips of young roots. The bacterium, which is described, was isolated and shown to grow readily in pure culture on nitrogen-free mannitol agar. It is assumed, though not yet proved, that it is capable of fixing atmospheric nitrogen.—Kuibyshev Inst. of Agriculture.

278. ROLLINS, R. C. 633.913-1.521

Interspecific hybridization in *Parthenium* I. Crosses between guayule (*P. argentatum*) and mariola (*P. incanum*).
Amer. J. Bot., 1945, 32: 395-405, bibl. 8.

The progenies of 36 crosses between guayule and mariola have been studied. Each species was used as the female parent in an equal number of successful crosses. Considering the ease with which hybrids may be obtained between guayule and mariola and the fact that mariola possesses characteristics which will probably prove to be of value in improving guayule as a rubber-producing crop-plant, there appears to be a definite place for interspecific hybridization involving these two species in the breeding programme concerned with guayule improvement. [From author's summary.]

279. CAMPBELL, W. A., AND SLEETH, B. 633.913-2.4

A root rot of guayule caused by *Pythium ultimum*.
Phytopathology, 1945, 35: 636-9.

Pythium ultimum Trow was determined as the causal agent of a root rot of nursery seedlings of guayule (*Parthenium argentatum* Gray, a source of rubber) in California. Two

stages of the disease are described: seedling root rot which affected plants in the cotyledon stage, and pink rot which affected plants from 6 to 16 weeks old. The over-all losses in the nurseries were not serious; however, the disease occasionally caused considerable mortality in localized areas especially on heavy, poorly drained soil. [From authors' summary.]

280. NEIMAN, G., AND SOSNOVEC, A. 633.913: 581.192

Qualitative changes in the rubber of guayule during storage. [Russian.]
Proc. Lenin. Acad. agric. Sci., 1944, No. 11-12, pp. 15-7.

Sheaves of guayule were baled under pressure, and the bales stacked. Protection from the weather was ensured. When samples of the crop were taken for laboratory tests the stack was found to be in good condition. Nevertheless, after the viscosity and other properties indicative of quality had been tested, it was concluded that a period of storage in the stack exceeding 45 to 50 days caused a big drop in quality of rubber. Such deterioration could not be attributed to an increase in the proportion of resins, or a decrease in that of rubber; but no attempt was made to detect changes in the hydrocarbon itself, where, it is believed, the real cause is likely to be found.

281. MEDVEDEV, P. F. 633.913

Topping as a means of increasing the yield of rubber from *Asclepias* species. [Russian.]
Vest. Soc. Rast. (Soviet Plant Industry Record), 1941, No. 1, pp. 89-94.

At the beginning of bud-formation or flowering, the inflorescences formed in the axils in the upper part of the plant were cut or pulled off. This treatment resulted in an abundant and lush growth of foliage which lasted for longer than usual. The rubber content of the leaves was not reduced and the yield of rubber per hectare was greatly increased.

282. PEDERSEN, A. 547.313.2: 635.11+633.63

Om bederoernes farver. (Colour in beet.)
[English summary 3 pp.]
Yearb. roy. vet. agric. Coll. Copenhagen 1944, pp. 60-111, bibl. 13.

The paper is divided into two parts. The first deals with genetic factors of colours and their inheritance, and the second with the influence of temperature and light on the colours of seedlings when germinated in the laboratory. Some practical consequences relating to the colours in seed growing, breeding and seed control are discussed.

283. GUM, O. B., BROWN, H. D., AND BURRELL, R. C. 546.27+546.711: 635.11+635.64

Some effects of boron and manganese on the quality of beets and tomatoes.
Plant Physiol., 1945, 20: 267-75, bibl. 13.

1. An outline of a procedure suitable for growing and analysing crops to determine the effects upon quality that result from various treatments with boron and manganese is presented. 2. Tomatoes showing manganese and boron deficiencies were grown during this investigation. Beets with marked evidences of boron deficiency were also obtained. Descriptions of these deficiencies as affecting foliage and fruit of the tomato and foliage and roots of the beet are given. 3. Results of analyses of plant samples from deficient and control plants are reported. [Authors' summary.]—Ohio State Univ., Columbus.

284. WALKER, J. C., JOLIVETTE, J. O., AND HARE, W. W. 635.11: 632.19: 546.27

Varietal susceptibility in garden beet to boron deficiency.
Soil Sci., 1945, 59: 461-4.

The present paper supplements work previously noted (H.A., 13: 505) on varietal differences in response to boron

deficiency in garden beet. It records a survey of stocks of some of the more commonly used varieties. The wide differences that occurred are of major importance. It is unlikely that any of the varieties tested, with one exception, can be relied upon to produce a healthy crop without correction of boron deficiency in the soil.

285. SOKOLOVA, A. M. 635.13: 631.531
A study of the biology and cultivation of carrots for the production of high quality seed. [Russian.]
Proc. sci. Conf. Timirjazev agric. Acad. 3-10 June, 1944, 1945, No. 1, pp. 44.

Carrot seed must be brought indoors before the onset of frosts, and there left to complete its ripening. If it is exposed to low temperature while still in process of ripening, its germination is greatly reduced.

286. ČESNOKOV, V. A. 635.13: 581.143.26.03
Vernalization of the carrot. [Russian.]
Ovoševodstvo (Vegetable growing), 1940, No. 2, pp. 30-1.

An experiment was carried out to test the effect of vernalization on carrots. Seed was sown on 28 August, 23 September and 25 October. All those showing germination on 2 November were transferred to a cold light site with a temperature 2-8° C., at which time the plants of the first sowing had 3 or 4 leaves, those of the second were about to form the second leaf, and those of the third showed cotyledons only. On 1 March the plants were transferred to a greenhouse where they stayed until 10 June when they were planted out in the open. Soon afterwards the plants of the first sowing put out a stem and behaved as second-year plants, producing in the autumn a good crop of ripe seeds. The plants of the other two sowings produced roots of large size but somewhat irregular in shape as a result of the transplanting.

287. HANSEN, E. 635.13: 577.16
Variations in the carotene content of carrots.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 355-8, bibl. 8.

Chantenay carrots grown between June and December increased in carotene content from 2.68 mg. to 10.31 mg. per 100 g. during the first 20 weeks, but thereafter showed little change. Winter-grown carrots were much lower in carotene than autumn and summer-grown ones. There were no significant varietal differences in content in the winter-grown crop, but one variety, *Imperator*, showed a higher content than 6 others which matured in the summer and autumn.

288. NIKIFOROV, S. P. 635.13: 631.531
A machine for rubbing carrot seed. [Russian.]
Proc. sci. Conf. Timirjazev agric. Acad. 3-10 June, 1944, 1945, No. 1, pp. 104-6.

The action of the machine is to cause the seeds to rub against one another and against those parts of the machine with which the seed is in contact, and so smooth down the surface of the seeds. The design of the machine is briefly described.

289. JACYNINA, K. N. 635.13: 631.531: 632.3
Loss of seed plants of carrots and methods of control. [Russian.]
Ovoševodstvo (Vegetable growing), 1940, No. 9, pp. 25-6.

In growing carrots for seed, loss occurs from rotting of the roots during storage and from the death of plants after the roots are planted; this is due to attacks by *Sclerotinia* [*? sclerotiorum*] and *Alternaria* [*? radicina*]. It was found that the storage rot could be largely controlled by treating the roots with a bactericide (composition not stated) just before they are put into clamps in autumn, and that the loss after planting can also be lessened by treating the roots with the bactericide on planting out.

290. WIESMANN, R. 635.13: 632.77
Untersuchungen über die Biologie und Bekämpfung der Möhrenfliege (*Psila rosae*). (Investigations on the biology and control of carrot fly.)
Forsch. Ergebn. Geb. Gartenb., 1942, H.2, pp. 41-64.

The biology of the carrot fly was studied at Wädenswil and trials with various chemicals were carried out. The following control measures are suggested under Swiss conditions: (1) Early sowings in March/April and harvesting before the end of July will prevent damage. (2) With sowings towards the end of April and in May the first fly generation is controlled by 4-5 applications at weekly intervals of a 0.2% fruit tree carbolineum at the rate of 2-3 litres per m² from the middle of May to the end of June. At least a month must elapse after the last treatment before the crop can be harvested. The carrots will be safe until the beginning of September. (3) The second fly generation is controlled by 4-5 applications at fortnightly intervals of 0.2% fruit tree carbolineum at the rate of 4 litres per m² from the end of July to the end of September. The treatment, which causes some reduction in yield, has no effect on the taste of carrots.

291. JARVIS, H. 632.7: 635.13 + 635.11
Carrot root aphid. Beet webworm.
Qd agric. J., 1945, 60: 353-7.

The damage caused by the carrot root aphid (*Anuraphis tulipae* Boy.) and the beet webworm (*Hymenia recurvalis* Zell.) is described and illustrated, and measures for their control are given. Nicotine dust is recommended for the former and arsenate of lead dust or derris dust for the latter.

292. ALLEGAERT, E. 635.136
Teelt van kervel in open lucht en onder glas.
(The cultivation of chervil in the open and under glass.)
Cultuur Hand., 1941, 9: 237.

After a brief description of the cultivated chervil (*Scandix cerefolium*) and its uses, notes are given on its cultivation in the open (particularly with reference to times and method of sowing the seed), under glass (time of sowing and further treatment), and for seed production.

293. SAIN, S. 635.24
The possibility of producing new varieties of Jerusalem artichoke by vegetative means. [Russian.]
Proc. Lenin. Acad. agric. Sci., 1944, No. 11-12, pp. 39-41.

It is hoped to raise a variety of *Helianthus tuberosus* which, when grown in the non-Black-Soil zone, will produce ample yields not only of foliage for conversion into silage, but also of tubers for fodder and industrial purposes. Flowering and tuber formation begin only after the autumn equinox, when the nights begin to lengthen. The eyes formed on the tubers are influenced by the same circumstance; the first to be formed—which are largest and best developed—are physically less mature than those formed later and less developed. They produce plants which yield less foliage and perhaps will not flower, and they form smaller tubers than the plants arising from the tardy and ill-developed but physically more mature eyes. It is believed that, by selecting plants from small eyes for several generations, varieties can be produced capable of yielding abundant foliage and large tubers within the short period between the autumn equinox and the beginning of cold weather.

294. COLBY, W. G., GILGUT, C. J., AND YEGIAN, H. M. 635.25
The culture of set onions in the Connecticut Valley.
Bull. Mass. agric. Exp. Stat. 424, 1945, pp. 16, bibl. 3.

The following extract from the authors' summary includes the principal results of experimental studies on certain phases of the growing, harvesting and storing of set onions

in the Connecticut Valley, conducted over a period of 3 years: (1) Domestic rye grass plowed under in the late fall is the most successful cover crop yet tried on onion land. (2) A characteristic dying back of onion leaf tips in mid-season can usually be attributed to fertilizer injury. (3) The performance of Globe type varieties has not been as consistent as that of the flat type Ebenezer variety. (4) Hand-planted sets will outyield machine-planted sets. (5) Maximum yields of marketable onions are usually obtained if sets ranging from $\frac{3}{4}$ to $\frac{5}{8}$ inch in size are spaced $2\frac{1}{4}$ to $2\frac{3}{4}$ inches in rows 13 to 14 inches apart. (6) The successful control of weeds is essential. Tractor cultivation can be practised during the early part of the growing season. (7) Seasonal weather conditions affect the keeping quality of onions more than any other single factor. Storage losses are usually high following wet seasons and low following dry ones. (8) The quality of seed sets is an important factor in the keeping quality of the mature bulbs, but the conditions which affect seed set quality have not as yet been determined. (9) Onions from locally produced seed sets have generally kept better in storage than onions from sets grown outside the Connecticut Valley. (10) The soil appears to be the principal source of inoculum for onion bulb rot diseases, and soil moisture appears to be the most important factor in promoting their development and prevalence. (11) Early harvested onions, although yielding less, keep better in storage than late harvested onions. Onions for storage should be harvested before all of the tops are down. (12) Onions in storage must be kept dry; and the colder they are kept without freezing the better."

295. BLAAUW, A. H., HARTSEMA, A. M., AND VAN BEEKOM, C. W. C. 635.25: 581.145
Bloemen of bollen bij *Allium cepa* L. (Flowers or bulbs in the onion.) [English summary.]
Proc. Nederl. Acad. Wetensch., 1941, 44: 244-252, 361-8, being *Meded. Lab. plphysiol. Onderz. Wageningen* 66.

For biennial culture the onion is sown very densely in the first year; the small onions are gathered in the summer and stored until the following spring. They are then planted again and in the second half of July give a crop of full-grown onions. Whether they will flower or produce good bulbs depends on the treatment of the small bulbs. The object of the present investigation was to find out what treatment induced flowering or non-flowering. In these experiments (1939/40) the bulbs were stored from August until the following March at temperatures ranging from 5° to 28° C. In the middle of March the temperature treatment was stopped and all bulbs kept at 9° C. until they were planted out early in April. The results obtained show that in order to prevent flower-stalks the onion sets must be stored at 23° to 28° C. (only 4% to 3% produced flower-stalks by 20 July). A treatment more or less in accordance with practical experience, "first cool, later warm", does not give a large percentage of flowering bulbs but it has no advantage over "always warm". The opinion, sometimes met with, that a high temperature would promote splitting, did not hold good for the variety used (Zittauer Riesen).

296. BLAAUW, A. H., HARTSEMA, A. M., AND LUYTEN, I. 635.25: 581.145
Bloemen of bollen bij *Allium Cepa* L. III en IV. (Flowers or bulbs in the onion. III and IV.)
Proc. Nederl. Acad. Wetensch., 1944, 53: 274-9, 280-91, being *Meded. Lab. Plphysiol. Onderz. Wageningen* 72, 18 pp.

Experiments made during 1940-1942 gave the following results: The best temperatures for storing onion sets with a view to a low number of seedstalks and high yield of marketable onions are 23° to 28° C. 31° C. proved to be too high, though yielding a small number of seedstalks. Contrary to the results obtained by Thompson and Smith (*H.A.*, 9: 904) neither -1° nor +2° C. were suitable for storage,

the number of seedstalks being too high and the yield of non-flowering bulbs less than with 23°-28° C. A combination of different temperatures and different periods gave at least as good results as 23°-28° C. during the whole storage period. The relative humidity during storage (50% and 70%) proved to have no influence on the percentage of lost bulbs or on the number of shoots from one bulb. The smallest size of onion sets (3.5-6 g. = \pm 16-20 mm. in diam.) gave a somewhat smaller yield than bigger sizes, but the disadvantage of using larger bulbs is that the percentage of seedstalks increases with the size of the bulbs.

297. SCULLY, N. J., PARKER, M. W., AND BORTHWICK, H. A. 635.25: 612.014.44
Interaction of nitrogen nutrition and photoperiod as expressed in bulbing and flower stalk development in onion.

Bot. Gaz., 1945, 107: 52-61, bibl. 9.

The results of varying both photoperiod and nitrogen supplies are very marked in bulb and flower stalk development of onion. Thus the amount of N supplied did not affect bulb development when a photoperiod substantially longer than that critical for bulb formation was used, but when the photoperiod used was at or near that critical for bulb formation, the greatest bulb development occurred with the lowest N concentration and the least with the highest concentration. It was found possible so to control photoperiod and N supply that onions could be grown from seed to seed without bulbing.

298. SPROSTON, T., Jr., AND BOYD, O. C. 635.25: 631.531.17

Onion seed treatments.

Abstr. in *Phytopathology*, 1945, 35: 656.

Seed treatments were used for onion and set production. The trials on seed for big onions included 8 treatments replicated 5 times in a latin-square designed experiment. Arasan, Thiosan and Fermate (100% and 75% by weight of seed), formaldehyde 1-100 at 100 gal. per acre and check. Data on total stand of seedlings and smutted seedlings were subjected to analysis of variance. On total stand of plants counted three weeks after sowing, all dry treatments stuck on the seed with methocel were significant (5% point) over formaldehyde and check. Arasan 100% was significant (5% point) over all other treatments except Arasan 75%. Using mean numbers of smutted seedlings, all treatments were significant over the check. There were no significant differences between any of the treatments in the control of smut. For set production there were twenty treatments using the same preparations at various rates. Arasan, stuck on or dry, was significant (5% point) in total stand of plants over all other treatments. All treatments including checks produced about 70% good sets. Considering ease of operation and results of set production, Arasan 5% to 8% would be preferable to formaldehyde.

299. BENNETT, E. 635.25: 581.192
A note on the presence of pyruvic acid in Ebenezer onions.

Plant Physiol., 1945, 20: 461-3, bibl. 9.

The data obtained indicate that pyruvic acid may accumulate in the Ebenezer onion and that certain bisulphite-binding compounds may be associated with the disappearance of pyruvic acid.

300. DORAN, W. L., AND SPROSTON, T., Jr. 635.25: 632.4

Control of onion smut by fungicides applied to the soil.

Abstr. in *Phytopathology*, 1945, 35: 654.

Onion smut, caused by *Urocystis cepulae*, was well controlled in greenhouse experiments by Fermate mixed with 5-8-7 fertilizer and applied to the soil immediately before seeding at the rate, per acre, of 58 lb. Fermate in 1,500 lb. of fertilizer. Fertilizer alone lessened the severity of smut.

301. WIESMANN, R. 635.261: 632.78
Versuche zur Bekämpfung der Lauchmotte
(*Acrolepia assectella*). (The control of *Acrolepia assectella* in leeks.)
ForschErgebn. Geb. Gartenb., 1942, H.2, pp. 29-40.
The leek pest *Acrolepia assectella*, the biology of which is described, causes considerable damage in Switzerland, occasionally more than 50% of the crop. Gesarol (DDT), applied as a dust at weekly intervals or as a spray four times at fortnightly intervals, gave excellent control at Wädenswil.
302. STUART, G. M. 635.263: 632.8
Yellow dwarf virus of shallots.
Gdnrs' Chron., 1945, 118: 201.
The East of Scotland College of Agriculture is building up a stock of virus-free shallots propagated from a single clove, which was selected by the author some years ago. It is hoped there will soon be sufficient material available to place it on the market. The inauguration of an inspection scheme by the Ministry is strongly urged.
303. SUN, V. G., AND SZE, L. C. 635.3
A note on "Tsontsai".
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 295-8.
On the basis of studies made at the National University of Chekiang, Meitan, Kweichow, China, Tsontsai was classified as a variety of *Brassica juncea* Coss. and was named *B. juncea* Coss. var. *linearifolia* Sun.
304. ISBELL, C. L. 635.34: 631.535.6
Propagating cabbage by root cuttings.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 341-4, bibl. 2.
The simple technique is described and the method is commended to the breeder.
305. PASHFIELD, G. 635.34: 632.6/7
Control of cabbage pests. Outstanding results with D.D.T. and 666 dusts.
Agric. Gaz. N.S.W., 1945, 56: 489-92.
The author describes the results of an experiment for the control of cabbage moth (*Plutella maculipennis*) and cabbage white butterfly (*Pieris rapae*) carried out between April and July, 1945. Cabbages dusted with $\frac{1}{2}$ %, 1% and 2% D.D.T.-pyrophyllite showed no sign of damage during the whole course of the experiment. A concentration of 1% 666-pyrophyllite dust was equally successful, except for a very light infestation of a number of cabbages during the first month. These results are particularly striking since 12 inches of rain fell during the experiment, and treatments were applied at 10 to 14 days' interval only, and not after each fall of rain. Treated cabbages were fed to domestic animals and some were eaten by human beings without any apparent ill effects.
306. POUND, G. S., AND WALKER, J. C. 635.34: 632.8
Differentiation of certain viruses by the use of temperature and host immunity reactions.
J. agric. Res., 1945, 71: 255-78, bibl. 16.
Namely cabbage virus A, cabbage black ring virus, cabbage virus B and cauliflower mosaic on cabbage.
307. WIESMANN, R. 635.34: 632.77
Untersuchungen über die Biologie und Bekämpfung der Kohlgallmücke, *Contarinia torquens*. (Investigations on the biology and control of the cabbage midge, *Contarinia torquens*.)
ForschErgebn. Geb. Gartenb., 1943, H.4, pp. 3-23.
Although *Contarinia torquens* is a common pest of cabbage in Switzerland and does considerable damage, no effective control measures had been devised prior to these experiments. Experiments conducted at Wädenswil and elsewhere for a period of years, yielded the following results: Repeated applications at weekly intervals of a 0.5% nicotine (15%) + 0.2% Sandovit spray gave satisfactory control in all types of cabbage family tested, including the more susceptible kinds such as cauliflower, savoy and red cabbage. The first treatment should be given shortly after planting out or, better still, in the frame shortly before planting out, 3-4 applications being the minimum. With the more susceptible types treatment should be continued until the head begins to form, and the heart must be thoroughly wetted.
308. ANON. 635.4: 632.4
Leaf spot of silver beet.
Agric. Gaz. N.S.W., 1945, 56: 459.
Leaf spot caused by the fungus *Cercospora beticola* is the most common disease of silver beet in New South Wales; beetroot is also affected but much less severely. The spots are ashy-coloured with a brownish margin and first appear on the outer, older leaves. They also develop on the leaf stalks, flower stalks, seed balls and seeds; the disease is, therefore, commonly carried on the seed. The seed should be dusted before sowing with one of the proprietary organic mercury dusts (1 level teaspoonful per lb.) or with copper oxychloride dust (4 level teaspoonful per lb.). Rotation of crops should be practised, planting silver beet or beetroot in the same land not more frequently than once in every three or four years. Spraying the plants with bordeaux mixture (1-1-10) or with copper oxychloride (1 oz. in 2 gallons of water) after the diseased leaves have been picked off will assist in controlling leaf spot.
309. BANGA, O. 635.52
Bijdrage tot het rassenonderzoek van kropsla (*Lactuca sativa* var. *capitata* L.). (Contribution to the study of head lettuce varieties.)
Meded. TuinbVoorlichtDienst, 14, 1939, 103 pp., bibl. 22.
128 samples of some 40 varieties of head lettuce under 68 different names have been tested in 6 different cultures in the years 1937 and 1938. The results here reported are mostly of the last two cultures, being an early planting in an unheated greenhouse in spring and an out-of-door sowing in summer. Observations have been made on differences in viability, in heading capacity, in length of growth phases and in morphology. By means of the established physiologic and morphologic characteristics it was determined which samples were identical or different, and which samples were, or were not, homogeneous. [Author's summary.]
310. ANON. 635.52
The cultivation of Cheshunt Early Giant lettuce in glasshouses.
Circ. Cheshunt exp. Res. Stat. 9, reprinted 1945, pp. 7.
A mass of valuable, eminently practical information is assembled in this comparatively short circular on all phases of cultivation of Cheshunt Early Giant lettuce, successful crops of which have been grown at Cheshunt since 1933. The variety is a short-day lettuce for sowing in England between the middle of August and the beginning of January, the average weight of the heads at Christmas being about 5 oz. and in February 7 oz. *Botrytis* control should be carried out by a keen-eyed worker walking slowly through the houses each morning and cutting out all leaves with brown blotches. Except immediately after a spell of foggy weather, this task can be performed by one or two men per acre employed for half an hour each morning. Picking and packing are also dealt with.
311. SIDORIN, M. 635.52: 631.55
Increased lettuce yields due to changed methods of picking. [Russian.]
Proc. Lenin. Acad. agric. Sci., 1945, No. 1-2, pp. 14-6.
The usual method of lifting the whole plant as soon as it has reached the required stage of maturity, was compared with that of cutting off some leaves at intervals and leaving

the plant to continue its growth until the final gathering when the whole plant is lifted. This procedure so stimulated growth that the total leaf area, weight of dry matter, and yield of fresh plant material were greater than those of plants which had been left undisturbed during the same period until gathering which took place on the same date as that of the others. It is claimed that the quality of the leaves was better, and that it was thus possible to maintain a steady yield of leaves over a longer period, but more labour was required.

312. NUTILE, G. E. 635.52: 631.531
Inducing dormancy in lettuce seed with coumarin.
Plant Physiol., 1945, 20: 433-42, bibl. 17.

Non-dormant lettuce seeds of the variety Black Seeded Simpson were made dormant or light sensitive by soaking the seeds in 25 p.p.m. of coumarin solution for 24 hours at 18°-20° C. After soaking, the seeds were rinsed in distilled water and germinated on blotters in petri dishes in light and darkness at 18°-20° C. Coumarin is photosensitive after entering the seed and will not exhibit any inhibitive effects on germination if the seeds are soaked in the light or if light strikes the seeds while wet. Dormancy could be induced in approximately 80% of the seeds as was shown in a dark test. A germination of approximately 99% was obtained in light. [From author's summary.]

313. ALLEGAART, —. 635.53
Bladselderij het gansche jaar door. (Celery throughout the year.)
Cultuur Hand., 1942, 10: 62-4.

The writer points out the advantage of being able to produce celery from March to June, after the normal crop is ended. Suitable varieties are mentioned and the preparation and manuring of the ground described. Seed can be sown during nine months of the year. By sowing November to January in a greenhouse at 16° to 18° C. (not higher than 20° C.) plants are ready for cool frames in February to April and may be harvested in May and June, or planted in a warm greenhouse for harvesting in April and May. For cropping in September and October the seed is sown in March to April in a cool frame, for winter cropping in the open ground, in May, June and August.

314. HADORN, C., AND SCHÜTZ, F. 635.53
Vergleichende Versuche zur Bekämpfung der Weissfleckenkrankheit der Sellerie. (Comparative trials for the control of leaf spot in celeriac.)
ForschErgebn. Geb. Gartenb., 1942, H.1, pp. 16-23.

Spraying trials have shown that the new copper oxychloride preparations are suitable for use in vegetable growing, leaf spot of celeriac caused by *Septoria apii* being satisfactorily and economically controlled.—Wädenswil Research Station.

315. JENNY, J., AND SCHÜTZ, F. 635.54: 631.588.1
Versuchsergebnisse über Zichorien-treiberei mit Hilfe von transportablen elektrischen Heizungen. (The forcing of chicory by means of movable electric heaters.)
ForschErgebn. Geb. Gartenb., 1942, H.2, pp. 3-8.

Movable electric soil heaters, which are described, were found to force chicory with similar efficiency, whether the heat was applied from the bottom or from the top. Plants forced without artificial heating under a good cover of leaf mould were less bitter and more tender.—Wädenswil Research Station.

316. STAEBELIN, M. 635.54: 632.4
Sklerotienkrankheit bei Zichorie. (*Sclerotinia sclerotiorum* and *S. minor* in chicory.)
ForschErgebn. Geb. Gartenb., 1942, H.1, p. 15.

Sclerotinia sclerotiorum and *S. minor* cause withering of the leaves and a soft rot of the roots in chicory. While on a small scale formalin and mercury-containing dusts may be

successfully applied, well-balanced fertilizer applications or generous applications of potash and phosphoric acid have made the plants sufficiently resistant to give control on a commercial scale. Nitrogenous and organic manure should be avoided. The roots must not be covered with soil on which lettuce, carrots, etc., have been grown, unless it has been partially sterilized with steam or formalin.—Lausanne Research Station.

317. BANGA, O. 635.55
Bijdrage tot het rassenonderzoek van andijvie (*Cichorium endivia*). (Contribution to the study of endive varieties.)
Meded. TuinbouwvoorlichtDienst, 32, 1942, 90 pp.

Strains of endive from various sources are compared. Differences in earliness, crop, response to vernalization, the stand of the heads, susceptibility to marginal scorch and heart rot (*Sclerotinia sclerotiorum*) were mostly based on analysis of variance. The chief characters, relative to quality and yield, of a number of varieties are described.

318. SINNOTT, E. W. 635.62: 581.14
The relation of growth to size in cucurbit fruits.
Amer. J. Bot., 1945, 32: 439-46, bibl. 8.

The volume of ovary and fruit was measured daily in a number of lines of cucurbits, chiefly *Cucurbita pepo*, which differ markedly in mature fruit size. These ranged from small gourds of about 40 c.c. to large pumpkins of about 7,000 c.c. Growth was studied from these measurements and from curves of the logarithm of volume plotted against time. Growth in all cases consists of an initial phase of constant exponential rate followed by one of gradual decrease. Final fruit size has little relation to rate of growth but is determined chiefly by its duration. Environmental factors affect growth rate and duration, but fruit size much less. There is little evidence of heterosis in fruit size, the F_1 fruits in most cases being not far from the geometric mean of their parent types. [From author's summary.]

319. REPIN, A. H., AND TISHKOV, S. I. 635.6: 631.531.17
Temperature treatment of the seed of cucurbits increases the yield. [Russian.]
Ovoshëvodstvo (Vegetable growing), 1940, No. 2, pp. 24-5.

Experiments at the Ukrainian Seed Institute were made in the laboratory with a heat treatment of seeds of cucumber, water-melon, and melon, to increase germination and improve the crop. The seeds were first dried, then heated at 40° to 70° C. for periods of from 30 min. to 12 hours, using dry and moist seed. The results varied with the treatment and the kind of seed. Thus the best results (as shown by the crop yielded by the treated seed) were obtained with cucumber from moist seed heated in air at 70° C. for two periods of 30 min. each: with water-melon with moist seed at 60° C. for 2 hours; and with melon with dry seed at 60° C. for 1 hour and at 40° C. for 4 hours.

320. READ, I. W. 635.61
The cultivation of melons.
J. roy. hort. Soc., 1945, 70: 338-9.

"Melons are the easiest possible crop to grow when understood" is the verdict of the author, who tells us how to do it.

321. MILLER, J. J. 635.611: 632.48
Studies on the *Fusarium* of muskmelon. II. Infection studies concerning the host range of the organism and the effect of environment on disease incidence.
Canad. J. Res., 1945, 23, Sec. C, pp. 166-87, bibl. 16.

A comparison of disease incidence resulting from equal degrees of infestation of sterilized and unsterilized soils led to the conclusion that the factor responsible for the suppression of disease incidence in unsterilized soil was biological.

There was a definite decrease in disease incidence above 30° C., but an accentuation with low soil moistures. Seedlings grown in naturally infested soil seldom wilted and, since the pathogen was shown to be present in this soil, a protective effect must have been operating. This was found associated with a severe stunting and both appeared due to biological causes.

322. OGIEFSKAYA, E. V., AND GAVRILOVA, Z. A. 635.615; 631.531.17

Disinfecting water-melon seed against fusarium wilt. [Russian.]

Ovoševodstvo (Vegetable growing), 1940, No. 2, pp. 28-9.

Good results were obtained in laboratory experiments with sublimate (mercuric chloride) 1:1,000 (10 min.), and formalin 1:300 (2-3 sec.).

323. TETJUREV, V. 635.624; 631.531

Dormancy in pumpkin seeds. [Russian.]

Proc. Lenin. Acad. agric. Sci., 1944, No. 11-12, pp. 12-4.

Two classes of factors inhibiting germination are distinguishable, namely those like temperature, arising from external conditions, and those which exist in the seed itself. The present short article explains that the inhibiting factor of the latter class is the endocarp. It is this particular layer of the seed-coat which excludes oxygen, and so prevents germination. It does not exclude water, which cannot, however, even when it has penetrated the seed, make it germinate. The endocarp can be removed, or rendered permeable to air, either artificially by abrasion or drying, or naturally by bacterial action.

324. Čížov, S. T. 635.63; 631.523

Yields of hybrid cucumbers in glasshouses. [Russian.]

Proc. sci. Conf. Timirjazev agric. Acad. 3-10 June, 1944, 1945, No. 1, pp. 42-3.

Cotton wool was used to keep the female flowers isolated these hybridization trials. In many of the hybrids yield was increased and the period of maturity shortened.

325. RODNIKOV, N. I. 635.63

The rate of maturity and the yield of cucumbers grown under glass, and their relationship to mineral nutrition. [Russian.]

Proc. sci. Conf. Timirjazev agric. Acad. 3-10 June, 1944, 1945, No. 1, pp. 45-6.

Cucumbers are very sensitive to excessive soil salinity, and when grown under glass their root space is limited. These two circumstances necessitate the application of manures at intervals rather than all at once. Only the relative amounts of the different elements have as yet been determined empirically, no fundamental principle having yet been discovered which will enable the nutritional requirements of a plant at any particular stage of growth to be determined. In the present article we read that during vegetation and flowering N should be the main element, and during the formation of the fruit K. Acting on this knowledge, the first cucumbers were ready in 33 to 36 days after sowing. It was also observed that correct mineral nutrition can influence the sex of the flowers; a large proportion of female flowers were produced, and were the first to form fruit.

326. FILOV, A. 635.63; 581.47

The connexion between the morphological characters of cucumber fruits, and their economically valuable qualities. [Russian.]

Vest. Soc. Rast. (Soviet Plant Industry Record), 1941, No. 1, pp. 126-32.

Microscopic study of the skin, tubercles, hairs and markings of the cucumber fruit has suggested that some relationship exists between these characters and the adaptability of a variety to a given environment and the quality of the fruit when salted.

327. LEWIS, V. M. 635.64; 664.84.64.036.5

Tomato varieties for canning.

Food Pres. Quart., 1945, 5: 11-14.

This is a report on the results of canning 16 varieties of tomatoes taken at three stages of maturity, viz. A. mature, fully coloured, slightly soft to the touch, B. mature, fully coloured but still quite firm, C. fruit still showing just a tinge of green on the shoulders. Detailed results are tabulated, the main points being these. Series A scored badly in drained weight and texture, but in colour they were much the best. In most respects the B series came intermediate between A and C. The fruit in C series had a good texture and gave high drained weight figures, but were poor in both colour and flavour. For good texture and drained weight it would probably be unwise to can tomatoes more mature than those of series B, while for colour and flavour the fruit should be fully coloured. Care should be taken not to include overmature fruit in the cans, as these lead to very noticeable off flavours.

328. ANON. 635.64

The cultivation of tomatoes in the open.

Circ. Cheshunt exp. Res. Stat. 13, revised 1943, pp. 6.

Market King, Potentate, Radio and Stonor's Exhibition, and Prolific are recommended as good tomato varieties, to be grown commercially in the open in England. Eighteen further varieties are listed, about which favourable reports have been received from County Horticultural Advisers. On the South Coast 3 trusses are considered desirable, while in colder areas 2 trusses may be the maximum. The circular deals further with the raising of young plants, treatment of the soil in the field, planting, staking, pruning and stopping, watering, top dressing and mulching, picking and spraying against blight.

329. SHILOV, M. S. 635.64; 635:35

Intensive vegetable cultivation in sheltered ground. [Russian.]

Ovoševodstvo (Vegetable growing), 1940, No. 2, pp. 12-3.

Intensive cultivation by interplanting one crop with another is described, particularly with reference to tomatoes interplanted with cauliflowers. The conditions for success are:—the main crop must ripen a short time before the secondary, interplanted, crop; the above-ground development of the two crops, and their requirements for light and soil nutrients must be different; and the soil and air moisture must be such that it is favourable for both.

330. SAPHIR, S. A. 635.64; 632.111

Raising frost resistant tomatoes. [Russian.]

Ovoševodstvo (Vegetable growing), 1940, No. 2, pp. 22-3.

Describes a frost-resistant form of tomato bred from the variety Sparks Earliana. Its characters are compared with those of the parent. It shows good growth at low temperatures such as 10° to 11° C. The seed is sown in the first half of April; at the end of April, when the seedlings have 3 or 4 leaves, they are pricked out into a cold frame. They are planted out in the open on 10-15 May.

331. ERMOLAEV, N. 635.64; 631.531

Methods of growing tomato seed for districts in the far north. [Russian.]

Vest. Soc. Rast. (Soviet Plant Industry Record), 1941, No. 1, pp. 71-6.

Until tomato varieties have been bred which ripen their fruit within the short period of the arctic summer, the following methods are recommended for ensuring the maximal yields of fruit and seed from the early varieties which are grown in the far north at the present time: (1) the tips of the plants are pinched off when three trusses have been formed; (2) five to seven of the best flowers are left on each truss; (3) side-shoots are pinched off every day

or alternate days; and (4) intra-variety crossing, with pollen drawn from many different plants, is practised in order that locally bred plants, adapted to their environment, may be produced.

332. BANGA, O. 635.64: 632.48
Een vergelijking van het voor meeldauw ontvare tomatenras "Vetomold" met enkele Nederlandse rassen van kastomaten. (A comparison of the variety Vetomold, resistant to leaf mould, with certain Dutch varieties of greenhouse tomatoes.)

Meded. TuinbouwlichtDienst, 24, 1941, 40 pp.

The tomato variety Vetomold was grown in a cool greenhouse with 11 varieties commonly cultivated in Holland. Each variety was grown in plots of 32 plants, repeated 3 times in such a way that the results could be analysed statistically. Its crop at Wageningen was lower than that of Ailsa Craig, but in comparison with the other 10 varieties the difference was not great enough to have any practical significance. No infection of Vetomold by leaf mould was observable in any of the three plots, even after spraying with a spore suspension. Vetomold is not equal to the best greenhouse tomatoes grown in Holland but it can be recommended for use in crossings with the best varieties.

333. WITHROW, A. P. 635.64: 612.014.44 + 577.15.04
Comparative effects of radiation and indolebutyric acid emulsion on tomato fruit productions.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 329-35, bibl. 9.

Results of experiments at Lafayette, Indiana, suggest the advisability of further investigating the combined effect of early treatment with high irradiances and treatment of the flowers of early clusters with a growth regulator on late winter or early spring greenhouse tomatoes.

334. WENT, F. W., AND CARTER, M. 635.64: 581.11
Wounding and sugar translocation.
Plant Physiol., 1945, 20: 457-60, bibl. 4.

Cutting of tomato leaves close to the path of food movement seems to inhibit sugar translocation in stems. Pinching off the leaves seems to interfere less with the sugar translocation than cutting them off with a sharp knife. [Authors' summary.]

335. WENT, F. W. 635.64
Plant growth under controlled conditions. V. The relation between age, light, variety and thermoperiodicity of tomatoes.
Amer. J. Bot., 1945, 32: 469-79.

The thermoperiodicity of tomato plants* was studied in detail, considering interrelations between age of plant, light intensity and variety on the one hand, and stem elongation at six night and two day temperatures on the other hand. It was found that a gradual shift of the optimal night temperature occurred, from 30° C. for the San Jose Canner and 13° C. for the Illinois T19 in the early fruiting stage. A similar response was found in 14 other tomato varieties, but they each had slightly different temperature characteristics. In general the English and greenhouse varieties grew fastest and had the lowest optimal night temperatures. Western varieties had the highest optimal night temperatures, and Eastern varieties were intermediate between the other two as far as night temperature was concerned, but had the lowest absolute growth rates. When the tomato plants were grown in full sunlight, their optimal night temperature was higher than on cloudy days, provided they were shaded by other plants. In artificial light the optimal night temperature fell off very rapidly with decreasing total illumination. Incidence of virus diseases was greatly modified by both day and night temperature. In the discussion it is pointed out that these complex interrelationships are examples of a multidimensional causality, which

* See also *H.A.*, 14: 1763.

can be presented properly only in multidimensional models. [Author's summary.]

336. VALLANCE, L. G. 635.64: 631.8
Fertilizing tomatoes.
Qd agric. J., 1945, 61: 76-86.

The importance of the three major plant foods, nitrogen, phosphoric acid and potash, is stressed. In the cultivation of tomatoes, as in other crops, it is necessary to provide all three in balanced proportions. The sources of each are discussed, the amounts required, the placement and time of application. Nitrogen should be present in the pre-planting mixture—that is, the fertilizer mixture which is applied to the soil before the plants are set out in the field—because most Queensland soils in areas suitable for tomato growing contain very little nitrogen which is readily available, but only moderate amounts should be applied. Queensland soils suitable for tomato growing seldom contain sufficient phosphoric acid under normal conditions to produce maximum yields; the symptoms of deficiency are, a bluish discoloration of the leaves, the veins on the under-side showing reddish-purple. Queensland soils in vegetable growing areas are, in general, fairly well supplied with potash, but often it is not available quickly enough to maintain rapid growth and heavy fruiting. Potash is most conveniently applied as a constituent of a complete fertilizer mixture.

337. GILJAROVSKI, I. P., AND ČERNOV, I. C. 546.27: 635.64 + 635.63
The effect of boron on increasing fruit production in tomatoes and cucumbers. [Russian.]
Ovoševodstvo (Vegetable growing), 1940, Nos. 11-12, pp. 28-9.

The author reviews current knowledge of the influence of boron on the productivity of various crops. Reference is made to the work of Prof. Bobko who states that boron tends to accumulate in the organs closely associated with the reproductive process (e.g. in the stigmas) and so may have some influence on the setting of the fruit. Experiments are described in which borax and boracite were applied to plots of tomatoes and cucumbers. In tomatoes they resulted in earlier ripening and increased yield, and in cucumbers to increased yield.

338. RICHARDS, M. C. 635.64: 632.4
The control of *Alternaria* blight on N. H. Victor tomatoes by the application of fungicides.
Abstr. in *Phytopathology*, 1945, 35: 656.

New Hampshire Victor tomato plants set 5×5 ft. in the field were sprayed five times from 30 July to 26 August, 1944, with three materials: copper oxychloride sulphate 1, 2, 4 and 8 lb. per 100; bordeaux mixture 1-1, 2-2, 4-4, and 8-8-100; and fermate $\frac{1}{2}$, 1, 2 and 4 lb. per 100. Each of the 12 treatments resulted in highly significant increases in yields of marketable fruits. None of the treatments increased the total yields significantly. The highest yield of marketable fruit was obtained with the fermate 4-100, a yield of 19.8 lb. per plant as compared to 9.4 lb. for the check. Equivalent control at 88.0% defoliation was obtained with the following: Fermate 1-100, bordeaux mixture 4-4-100, and copper oxychloride sulphate 9.5-100.

339. SLOAN, W. J. S. 635.64: 632.6/7
The control of tomato pests.
Qd agric. J., 1945, 61: 17-41.

A key is given for distinguishing tomato pests in Queensland. They are grouped under I. Root and seedling pests—nematodes, brown scarab beetle, cutworms, false wireworm, grasshoppers. II. Stem and foliage pests—mites, jassids, mirids, aphids, leaf-eating looper, potato tuber moth. III. Fruit and flower pests—corn ear worm, potato tuber moth, cutworms, rot and fruit flies, green vegetable bug,

shield bugs, Rutherglen bug, thrips. These pests are then described and illustrated, and measures for their control recommended.

340. GUADAGNIN, L. 635.646
Instruções sobre a cultura da beringela. (Advice on egg-plant cultivation.)
Ceres, 1944, 6: 19-21.

Five varieties of egg-plant (*Solanum melongena*) are recommended for cultivation, i.e. beringela roxa comprida (long red), redonda (round), and mostruosa das canárias (var., from the Canary Islands), also branca longa (long white) of Japan, and branca redonda (round white). The seeds are sown in furrows 2 cm. deep and 10 cm. apart. The seedlings should be sprayed with nicotine (4%) against the attacks of small *Coleoptera*, and with bordeaux mixture to prevent infection by fungi. When the seedlings are 5 cm. high they are pricked out at 10 to 15 cm. apart. When 15 to 20 cm. high they must be transplanted carefully to their permanent sites, which should be soil well cultivated and manured. They are planted in double rows, the two rows 50 cm. apart, and 80 cm. between the double rows, with the plants 50 cm. apart, those of one row alternating with those of the other. The plot should be irrigated once a week and the ground well tilled to retain the moisture necessary for good development. The fruit is removed just before it begins to show any yellow coloration. The ground should come under rotation; plants of the same family, i.e. the *Solanaceae*, should be avoided, but other vegetables can be included.

341. MEGALOV, V. 632.48: 635.646 + 633.842
Wilting of egg-plants and pepper. [Russian.]
Ovošćevodstvo (Vegetable growing), 1940, Nos. 11-12, pp. 35-6.

A wilting of the egg-plant and of pepper (*Capsicum annuum*) in certain areas of southern Russia has been attributed, from laboratory investigations, to infection, in some cases by *Fusarium* and in others by *Verticillium*. The author considers that the fungi are secondary factors and that the primary cause is the harmful effect of the high temperatures at the surface of the soil, causing coagulation of the protoplasm of the cells and then the death of cells of the stem at the collar, where the plant tissues come in direct contact with the highly heated surface layer of soil. Infection by the parasites follows at the damaged spots and intensifies the wilting. The hard crust formed by the dried-out soil after rain or watering followed by hot sunshine causes mechanical injury which also allows of fungal infection. Control measures recommended are: (1) rather dense planting so that the foliage shades the stems at ground level, (2) rows to run north and south so that the plants shade each other during the heat at midday, (3) refraining from watering during the heat of the day so as to avoid a sudden lowering of temperature, (4) avoiding over-watering, (5) loosening the soil after watering, (6) planting the seedlings in holes filled with manure, which not only serves as nutrient but also prevents the formation of a hard crust of soil immediately round the plants, (7) mulching the soil.

342. ANON. 635.65
Certification of French bean seed.
Agric. Gaz. N.S.W., 1945, 56: 349-52.

A bean seed certification scheme has been introduced in New South Wales to ensure that growers may have a guarantee that the seed which they buy is not seriously affected with disease. The scheme aims to provide seed free from bacterial blight (mostly caused by *Pseudomonas medicaginis* var. *phaseolicola*), anthracnose (*Colletotrichum lindemuthianum*), and "scald", and reasonably free from mosaic and other seed-borne diseases. These diseases are briefly described to enable growers to recognize the symptoms. The article ends with a copy of the regulations for certification of French bean seed.

343. HIBBARD, A. D., AND FLYNN, L. M.

635.65: 577.16
Effect of maturity on the vitamin content of green snap beans.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 350-4, bibl. 10.

Tests at the University of Missouri, Columbia, indicate that green beans harvested as soon as the pods have reached full length will give both maximum production and the best balance of vitamins.

344. HADORN, C. 635.65: 632.3
Eine neue Bakteriose der Bohnen? (A new bacteriosis of beans?)
ForschErgebn. Geb. Gartenb., 1945, H.2, pp. 26-8.

A bacterial disease of beans not previously reported in Switzerland was studied in the variety Sans Pareil. The most conspicuous symptom of the malady, which appears to be transmitted by seed, is wilting. *Bacterium* (*Pseudomonas*) *flaccumfaciens* is provisionally regarded as the causal organism.—Wädenswil Research Station.

345. WESTON, W. A. R. D. 635.65: 632.4
Bean rot.

Agriculture, Lond., 1945, 52: 425-6.

Bean rot, caused by *Sclerotinia trifoliorum*, may be avoided by not growing beans on land that is clover-sick. The life history of the fungus is illustrated by drawings.

346. HOWARD, F. L., AND ANDERSEN, E. M. 635.65: 632.48

Susceptibility of Logan and Florida Belle beans to *Fusarium* yellows.

Abstr. in *Phytopathology*, 1945, 35: 655.

Characteristic *Fusarium* yellows developed in Logan and Florida Belle among eleven snap bean varieties planted in a randomized, four-replicate design at the Rhode Island Experiment Station in 1944. Following a dry summer with high soil temperatures, 37% and 45% of the Florida Belle and 82% of the Logan foliage was dead at the close of the picking season on 1 September. None of the other varieties had such disease symptoms. This experience emphasizes the necessity of trying new varieties under local edaphic conditions before making extensive plantings.

347. HADORN, C. 635.65: 631.531.17
Bohnenkrankheiten und Bekämpfungsversuche mit Saatbeizmitteln. (The control of bean diseases by seed disinfection.)

ForschErgebn. Geb. Gartenb., 1944, H.5, pp. 3-33.

Tests of 13 fungicidal dusts and solutions showed that at the moment complete disinfection of bean seed is not possible. Anthracnose was controlled by a mercury-containing Ceretan dust preparation, provided the infection was confined to the seed coat and had not yet reached the cotyledons. Seed treatment had no effect in the case of halo blight. Spraying against these two diseases and against bean leaf spot and rust as well as cultural control measures and seed selection are also discussed.—Wädenswil Research Station.

348. SCHNEIDER, F. 635.65: 632.753

Eine Ursache der raschen Blattlausvermehrung an Bohnen. (A cause of the rapid multiplication of black aphids on beans.)

ForschErgebn. Geb. Gartenb., 1944, H.5, pp. 34-7.

It was observed that black aphid predators are liable to be caught in the hooked hairs of bean leaves, while the multiplication of aphids proceeds unchecked.

349. PEPPER, B. B. 635.65: 632.76
The Mexican bean beetle.

Circ. N. Jer. agric. Exp. Stat. 495, 1945, pp. 12, bibl. 2.

For the control of the Mexican bean beetle, *Epilachna varivestis*, which has proved very destructive in America,

spraying (0.015%) or dusting (0.5-0.75%) with rotenone is recommended. If leathoppers, red spider or powdery mildew are to be combated at the same time, a dust should be used, in which 25% of the diluent is substituted by an equal weight of sulphur. Especially in the case of string beans, early planting or planting at dates which will bring the maturity of the crop between the peaks of abundance of the different beetle generations, will aid in the control of the pest. Spacings of 4-6 in. in the row were found usually to give the most satisfactory conditions for yield and beetle control. As soon as the crop is harvested all bean plants should be ploughed under to a depth of 6-7 inches.

350. SCHRADER, O. L. 635.653
Estudo de alguns fatores que influenciam na produção dos feijões de lima da variedade Fordhook. (A study of certain factors influencing the yield of the Fordhook bush lima bean.)
Bol. Minist. Agric. Rio de J., 1943, 32: 1: 1-52, bibl. 37.

In some places in the United States and at certain periods of the year the Fordhook bush lima bean (*Phaseolus limensis* var. *limenans* Bailey) has often failed to give profitable yields, and many growers, especially in Florida, have suffered great losses. The experiment described was carried out in order to study the effect of certain factors that may have an influence upon flower abscission. For this work 240 plots were planted in the garden of the Horticultural Department on the University of Florida campus. Four plantings were made of five different strains. Applications of nitrate of soda at 90, 180 and 360 kilograms per hectare yielded no distinct response; the differences obtained showed no significant difference when tested by analysis of variance. The application of 0.4% aqueous solution spray of indolebutyric acid when the blossoms were open gave a significant decrease in the yield of beans. An analysis of correlation showed that a linear relation exists between the number of pods and the number of seeds set. After the plant begins to set fruit there is a steady decrease in percentage of flowers which set fruit, until the capacity of setting is reached. A study of the maximum temperature on three different dates of flower tagging showed no correlation with the flower abscission. [From author's summary.]

351. PARKER, M. W., AND OTHERS. 635.655: 612.014.44
Action spectrum for the photoperiodic control of floral initiation in Biloxi soybean.
Science, 1945, 102: 152-5, bibl. 1.

A study of the effect of various wave-lengths of visible light on the dark period interruption for Biloxi soybean has been made with a specially designed spectrograph, which is described. Results from many experiments have been combined in a curve, covering the region from 3,800 Å to 7,200 Å, beyond which floral initiation was not inhibited. The over-all response curve has striking similarities to the curve for photosynthetic utilization of carbon dioxide, showing in particular the same action limit in the red and two maxima, one in the red, the other in the blue. The curve indicates that the chloroplast pigments of the leaf are associated with the dark period interruption reaction. It is likely that the action spectrum is due to a porphyrin-like material which is probably chlorophyll.—U.S. Department of Agriculture, Beltsville, Md.

352. POST, J. J. 635.655
Enkele aantekeningen over de cultuur van de sojaboon in Nederland. (Notes on the cultivation of the soybean in Holland.)
Reprint, *Meded. Insp. Tuinb.*, Mei 1944, pp. 209-10.

In recent years interest has been roused in Holland with regard to the possibility of raising profitable soybean crops there. During the last 10 years more than 2,000 varieties

and selections received from various parts of the world have been tested for their suitability for cultivation in Holland, for the beans have a high oil (15-20%) and protein (40%) content. Selections have been made and crossings between varieties have been carried out. Further investigation is indicated, particularly with reference to the root nodule organism of soya and to manuring.

353. POST, J. J. 635.655: 581.192
Oogstanalyse bij sojabonen, vergelijking van 6 rassen. (Crop analysis in soybeans, a comparison of 6 varieties.)
Landbouwk. Tijdschr., 1944, 56: 256-65.

Under crop analysis is understood the analysis of the average yield per plant and per variety in the total morphological characters. Six varieties of soybean were compared. The analysis comprised analysis of stems and of the crops themselves. In the stem analysis distinction was made between characters from direct observation and those derived from the records. Distinction was made also between simple and compound characters. Latin square calculation showed the measure of significance of the differences which appeared in the values of the different characters. The differences which occur between the varieties are significant in proportion as the characters are less compounded.

354. OLIVE, L. S., AND OTHERS. 635.655: 632.4
A leaf spot of cowpea and soybean caused by an undescribed species of *Helminthosporium*.
Phytopathology, 1945, 35: 822-31.

A species of *Helminthosporium*, apparently hitherto undescribed, has been found to cause a severe leaf spotting of cowpeas, with stem infections late in the season, and a light spotting of soybean leaves.

355. HILDEBRAND, A. A., MILLER, J. J., AND KOCH, L. W. 635.655: 632.4
Some studies of *Macrophomina phaseoli* (Maulb.) Ashby in Ontario.
Sci. Agric., 1945, 25: 690-706, bibl. 16.

Two isolates of *Macrophomina phaseoli*, the cause of charcoal rot of soybean, one from soybean in Ontario, the other from a cotton plant in Texas, were compared morphologically and tested for pathogenicity on soybean and corn. On corn, at controlled temperatures, the parasitism was of the facultative type, on soybeans both strains showed definite, but limited, primary parasitism. The two strains have been differentiated on their difference in size and number of sclerotia in culture. The parasitism of *M. phaseoli* in relation to certain biotic and abiotic factors is discussed.

356. WELLENSICK, S. J. 635.656: 631.55
Oogstanalyse I: oriëntatie bij erwten. (Yield-analysis I: orientation with peas.)
Meded. Landb.Hoogesl. Wageningen, 1941, dl. 45, verh. 1, 29 pp., bibl. 5.

The author defines yield-analysis as the analysis of the average yield per plant per race in its composing morphological characteristics. After an introduction description of methods and material are given followed by the experimental data under (1) analysis of the average stem length in 12 races, (2) analysis of the average crop in the 12 races (3) variability of directly determined yield-factors, (4) the production of dry matter in the 12 races, (5) comparison of yield-analysis in four groups of races. The importance of yield-analysis is discussed. From a general discussion of the results obtained and of the future development of the work it is concluded that the breeding-method of combining characteristics after crossing should be based on a knowledge of the morphological yield-analytical factors in the parent of the cross and should aim at reaching a combination of certain of these factors. The seed: straw ratio plays an important part as one of them.

557. ORCHARD, H. H. 635.656
Growing peas for canning.
J. Dep. Agric. S. Aust., 1945, 48: 512-5.
 During the war, pea canning has become an established industry in South Australia. The seed supplied to growers in the State by the Commonwealth Seeds Committee, following fungicidal treatment, is of the variety Wilt Resistant Perfection. The organization of the industry and the highly mechanized harvesting equipment are here described.
558. PROSKURIAKOV, N. I., AND PAVLINOVA, O. A. 635.8: 577.16
Mushrooms as a source of vitamin PP.
C.R. Acad. Sci. U.R.S.S., 1945, 47: 283-5, bibl. 7.
 The following edible fungi collected in the Moscow region were found to be rich sources of nicotinic acid: *Armillaria mellea* (34-15 mg.% of dry matter), *Boletus versipellis* (36-14), *B. bovinus* (49-75), *Cantharellus cibarius* (50-21), *B. scaber* (63-13), *B. edulis I* (71-64), *B. edulis II* (75-44).—M.V. Lomonosov State University, Moscow.
559. a BERNSTEIN, L., HAMNER, K. C., AND PARKS, R. Q. 635.12: 577.16: 631.8
The influence of mineral nutrition, soil fertility, and climate on carotene and ascorbic acid content of turnip greens.
Plant Physiol., 1945, 20: 540-72, bibl. 18.
 b BOWMAN, D. E. 635.65: 577.15.04
Amylase inhibitor of navy beans.
Science, 1945, 102: 358-9.
 c MEYER, B. S. 633.913-2.19
Effects of deficiencies of certain mineral elements on the development of *Taraxacum kok-saghyz*.
Amer. J. Bot., 32: 523-8, bibl. 11.
 d BORG, Å. 635.31: 632.77
Sparrisflugan ett för vårt land nytt skadedjur. (The asparagus fly, *Platyparaea poeciloptera*, recorded for the first time in Sweden.)
Växtskyddsnotiser, 1945, No. 4, pp. 59-60.
- e COX, L. G., MUNGER, H. M., AND SMITH, E. A. 635.34: 631.531
A germination inhibitor in the seed coats of certain varieties of cabbage.
Plant Physiol., 1945, 20: 289-94, bibl. 7.
 f KELSHEIMER, E. G. 632.729: 632.944
Naphthalene flakes keep mole-crickets from seedbeds.
Pr. Bull. Fla agric. Exp. Stat. 611, 1945, pp. 4.
 g KJELLANDER, E. 633.85-2.77
Vallmomyggan, ett nytt skadedjur på oljevallm. (*Carpodiplosis papaveris*, a new pest of oil poppies in Sweden.)
Växtskyddsnotiser, 1945, No. 1, pp. 15-6.
 h KÖRTING, A. 633.85-2.768
Über die Lebensweise des gefleckten Kohltriebrüsslers (*Ceutorrhynchus quadridens* Panz.) und seine Bedeutung als Ölfruchtschädling. (The biology of *Ceutorrhynchus quadridens* and its significance as a pest of oil seed crops.)
Arb. physiol. angew. Ent., 1942, 9: 207-37, from abstract *Zbl. Bakt.*, Abt. II, 1944, 106: 399.
 i KOSTROV, N. I. 635.1/7
Characteristic features of the organisation of vegetable growing collective farms on the outskirts of Moscow.
Proc. sci. Conf. Timirjazev agric. Acad. 3-10 June, 1944, 1945, No. 1, pp. 137-9.
 j OBA, G. I., RINER, M. E., AND SCOTT, D. H. 635.64 : 631.521
Experimental production of hybrid tomato seed.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 269-76, bibl. 18.
 k OVERCASH, J. P. 633.84
Propagation and culture of garden sage in Tennessee.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 345-9, bibl. 2.

FLOWERS AND ORNAMENTALS.

560. Roodenburg, J. W. M. 635.9
Onderzoekingen over 1939-1940. (Investigations at Aalsmeer in 1939-40.)
Jaarversl. Proeft. Bloem. Aalsmeer, 1939-1940, pp. 11-6.
 Investigations carried out by the author included (1) Short-day treatment in August and September, and long-day treatment by the use of artificial light in autumn, to hasten the blooming of certain ornamental plants, (2) laboratory experiments with paradi chlorobenzol on mites, thrips, flea beetles and aphids, (3) observations on diseases of cyclamen, carnation and sweet-pea.
561. Roodenburg, J. W. M. 635.9
Onderzoekingen. (Investigations at Aalsmeer.)
Jaarversl. Proeft. Bloem. Aalsmeer, 1941, pp. 16-30.
 Comprises notes on various physiological and pathological factors associated with the cultivation of ornamental plants, e.g. the influence of temperature on blooming, the use of growth substances on cuttings, stem rot of carnation caused by *Phialophora*, seed treatment for cyclamen, larvae of the yew beetle (*Otiorynchus sulcatus*) infecting cyclamen, treatment against soil-sickness for sweet peas, team sterilization of soil.
562. VAN MARLE, G. S. 635.9: 632.6/7
Onderzoekingen. (Investigations at Aalsmeer.)
Jaarversl. Proeft. Bloem. Aalsmeer, 1941, pp. 12-6.
 An account of the work carried out at the Aalsmeer experiment garden at Aalsmeer on pests of ornamental plants, with special reference to life-history and control of *Tarsonemus latus* Banks, and trials of insecticides against sawfly larvae on roses.
563. VAN SLOOTEREN, E. 632.8
De betekenis van de serologie voor het virus-onderzoek. (The significance of serology in virus research.)
Meded. Inst. Phytopath. Lab. Bloembol. Lisse, 72, 1943, 21 pp., reprinted from *Tijdschr. Plziekt.*, 1943, Vol. 49, No. 1.
 This is a general account of serology and serological methods with special reference to the application of the technique to the investigation of virus diseases of plants. It is stressed that the methods are of no direct therapeutic value in the control of plant diseases but that they may be extremely useful in diagnosing virus diseases of plants. A brief reference is made to the serological work started at the Lisse experiment station, and it is stated that an antiserum with a relatively high titre can be prepared from narcissi, tulips, hyacinths and irises.
564. AMSLER, M. 581.142
The effect of artificial frost on seed germination.
J. roy. hort. Soc., 1945, 70: 316-7.
 In a small-scale experiment, seed of *Primula*, *Meconopsis* and *Gentiana* species germinated satisfactorily in summer after soaking in water for 24 hours at 70°-100° F. and freezing in a domestic refrigerator for another 24 hours.

365. VAN HOLDEN, J. 635.938.86
De vroege geschiedenis van de fuchsia-cultuur (tot 1850). (The history of fuchsia culture up to 1850.)
Cultuur Hand., 1945, 11: 13.
Chronological notes on the history of the fuchsia and its cultivation from 1703 to 1850.
366. BUCKHURST, C. D. 635.939.98: 632.651.3
Hot water treatment of chrysanthemums.
Gdnrs' Chron., 1945, 118: 210.
A simple method is described by which small quantities of chrysanthemums may be treated against eelworm at a water temperature of 110° F.
367. VAN STEEN, J. 633.854
Helianthusorten (zonnenbloemen). (Helianthus species (sunflowers).)
Cultuur Hand., 1945, 11: 100-1.
Brief notes on a number of garden forms of sunflower, with a more extended description of *Helianthus sparsifolius*, a rather recent hybrid of *H. rigidus* and *H. annuus californicus*.
368. ILTIS, H. 635.939.98: 575.252
Bud-mutations in the marigold.
J. Hered., 1945, 36: 291-5, bibl. 14.
This paper describes "a peculiar and conspicuous bud-mutation observed simultaneously in three plants of a bed of French marigolds (*Tagetes patula*) in the fall of 1943". Beside the normal flower heads there were on each of these three plants other flowers with no or with abortive petaloid ray flowers but with a very much increased number (about 90) of bright yellow disc-flowers.
369. HADORN, C. 635.9: 632.8
Marmorierte Panaschüre oder Gelbfleckigkeit der Blätter von *Saintpaulia* und verwandter Arten. (Mottling or yellow leaf spot of *Saintpaulia* and related species.)
ForschErgebn. Geb. Gartenb., 1942, H.1, pp. 13-5.
Mottling in *Saintpaulia* and other *Gesneriaceae* is caused by too intensive radiation as well as by variations in the greenhouse temperature and can therefore be prevented by proper cultural care.—Wädenswil Research Station.
370. TINCKER, M. A. H. 631.532/535
Propagation, degeneration and vigour of growth.
J. roy. hort. Soc., 1945, 70: 333-7, bibl. 14.
Well-established facts are set out relating to the effect of continued vegetative propagation on the vigour of flowering trees and shrubs. It is explained that the phenomenon of degeneration associated with continued vegetative propagation is largely due to virus infection.
371. KNIGHT, F. P. 631.532/535: 635.976/977
Vegetative propagation of flowering trees and shrubs.
J. roy. hort. Soc., 1945, 70: 319-30.
This lecture was given in September 1945 for the benefit of amateurs, who are now likely to relinquish their food production in favour of more elegant garden hobbies. The vegetative propagation of flowering trees and shrubs is discussed under the following headings:—Division; layering; propagation by cuttings: hard wood cuttings inserted out of doors, cuttings in bell glasses, hand lights and cold frames, warm propagating frames, the sun frame, internodal cuttings, chemical treatment and plant hormones, leaf bud cuttings, monocotyledonous shrubs from cuttings, root cuttings; budding and grafting. The processes described are illustrated by 8 photographs.
372. VAN DER LEK, H. A. A., AND KRIJTHE, E. 577.15.04: 635.976.32: 631.535
Over het stekken van sering met toepassing van groeistof. (On the application of growth substances to lilac cuttings.)
Meded. TuinbVoortlichtDienst. 35, 1943, 35 pp.
Experiments are described in which growth-promoting substances were used on lilac cuttings with the object of
- hastening root production, using indoleacetic acid and naphthaleneacetic acid and their potassium salts, applied by the dry method (as powder with powdered talc as carrier) and by the absorption through the cut ends of the substances in solution. Very good results were obtained on the whole with the dry method, but in certain trials the wet method gave better results.
373. OLIVER, R. W., DAVIS, M. B., AND WATSON, E. B. 635.976(71)
Ornamental shrubs and woody climbers more commonly used for landscape purposes throughout Canada.
Publ. Canada Dep. Agric. 713, reprint 1944, pp. 35, being *Fmrs' Bull.* 100.
About one-third of the publication is devoted to notes on individual shrubs, including pruning, and on individual climbers hardy at Ottawa. Further, the uses of shrubs in the landscape, their propagation and care prior to planting, planting and after-care are dealt with in some detail. Insect pests of ornamental shrubs are also discussed. The information presented is summarized in tables, which briefly denote habit of growth, foliage, bloom, soil and light requirements and use in landscape composition, the shrubs being arranged alphabetically in size groups. A second series of tables shows the more common shrubs and woody climbers growing at each of the branch farms throughout the Dominion Experimental Farms System and at the Ontario stations Guelph and Vineland, with notes on their hardiness.
374. WYMAN, D. 635.976
Growth and general performance of plant materials used as hedges.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 423-6, bibl. 2.
An account of 115 species planted for trial as hedges in the Arnold Arboretum in 1936/1937. Details are given of their growth to date and more than 60 are classed as satisfactory in as much as they are all very dense, well-branched completely to the ground and grown together to form continuous hedges.
375. CONNORS, C. H. 635.976.84
Care of evergreens.
Circ. N. Jer. agric. Exp. Stat. 497, 1945, pp. 16.
The illustrated bulletin deals with the culture of evergreens, viz. site and soil, planting, mulching, fertilizing, watering, pruning (general, pruning fine-leaved types, fir, spruce and pine, root pruning, summer pruning, pruning specimen trees); the browning of leaves in summer and in winter; pests, diseases and their control.
376. VAN HOLDER, J. 635.976.4
Wintergroene sierheesters. (Evergreen ornamental shrubs.)
Cultuur Hand., 1945, 11: 138-9.
Descriptions, with drawings of *Eleagnus pungens* and two of its varieties, *Phillyrea decora* and *P. latifolia*, *Osmanthus aquifolium* and three varieties, *Prunus laurocerasus* var. *zabelliana*, *Osmorhiza* (*Nuttallia*) *cerasiformis*, *Exochorda racemosa* and *Berberis ilicifolia*.
377. HANGER, F. 635.939.124
The cultivation of rhododendrons.
J. roy. hort. Soc., 1945, 70: 355-62.
A brief outline of the outstanding elementary points necessary for the prosperity of the genus, addressed to the more amateur rhododendron enthusiasts. The discussion includes such subjects as origin, water requirements, locality, transplanting, seed raising, propagation by grafting, cuttings and layers.
378. ROEKENS, F. 635.977
Catalpa, trompettenboom. (Catalpa, trumpet tree.)
Cultuur Hand., 1945, 11: 86-7.
Describes *Catalpa bignonioides* and its varieties, and other

species of *Catalpa*, with special reference to those that can be grown as ornamental trees in gardens.

79. WILSON, G. F. 632.6/7: 635.976.33

Insect pests of *Cotoneaster horizontalis*.

J. roy. hort. Soc., 1945, 70: 27-5, bibl. 13.

Notes on a number of insect species, indigenous to Britain, which have become pests of *Cotoneaster horizontalis*, most of them being familiar to horticulturists as pests of fruit trees. Control measures are indicated. Pyralid moth, tortricid moth and hawthorn webber should be controlled by nicotine dust applied at high temperatures in the autumn and/or early spring, while an arsenical wash applied to the foliage will prevent further injury. In the case of the tortricid moth spring dusting is preferable to autumn dusting. In recent investigations DDT used as a 5% dust or as an emulsion in oil has proved effective against leaf-eating caterpillars on cotoneaster. A map shows the incidence in England of *Lecanium carni*, *Eriosoma lanigerum*, *Scythropia cataegalla* and *Eurhodope suavelia* on the basis of material submitted to the Wisley laboratory.

80. BEKETOVSKIĖ, D. N., AND ŠELJUTO, M. I. 634.23

The biological character of the first generation (F) of the heterogeneous form of the steppe-cherry (*Prunus chamaecerasus* var. *pendula* Dipp. *foliis variegatis*). [Russian.]

J. Bot. U.R.S.S., 1945, Vol. 30, No. 2, pp. 77-94.

Specimens of *P. chamaecerasus* with either variegated or "weeping" foliage have been met with; but this is believed to be the first on record to bear both characters. Though grafted on a vigorous stock, the tree grew feebly and at last died. There were, nevertheless, opportunities to propagate by cuttings which, having grown sufficiently, were planted out in their permanent quarters, where there were no trees of the same species growing in the vicinity, but several cultivated varieties of *P. cerasus*, the pollen of which, it was presumed, fertilized the flowers. The stones of the fruit that were formed were vernalized and planted. Seven young hybrid seedlings survived, and are described in this article. None of them had foliage which was both variegated and "weeping": it was either the one or the other; some of them bore neither character; and no character from either of the parents was dominant in all the seven seedlings. Observations carried out during growth development showed that, in comparison with *P. cerasus*, they lacked vigour; though they flowered freely, only some of the hybrids were able to form a little fruit. Investigation into the setting of fruit and into various types of pollination led to the conclusion that the sexual reproductive system of the hybrids was much deranged—a circumstance which, according to Mičurin and Lysenko, should provide the plant breeder with an opportunity of guiding the development of the hybrids in the desired direction. There was only faint evidence that the vigour of the hybrids, as regards fruit formation, increased in process of time; but it is believed that this increase could be hastened by means of grafting.

81. PRESTON, I. 634.12

Rosybloom crabapples for northern gardens.

Reprinted from *J. N. York bot. Gard.*, 1944, 45: 169-74.

A new race of hardy ornamental hybrid crabapples has been produced at the Central Experimental Farm, Ottawa, by crossing *Malus pumila* var. *niedzwetzkyana* with *M. baccata*. Fifteen varieties named after Canadian lakes are described, some of them are pictured. The date of flowering varies with the season from the first to the third week in May. The fruits of many of these varieties will yield bright red jelly of good flavour, the large fruited kinds having interested commercial fruit growers, who wish to plant them for jamming. The small-fruited varieties, which also yield jelly of good quality, are more floriferous and therefore more ornamental than the large-fruited plants.

382. TAYLOR, G. M.

635.937.34

Roses after the war.

J. roy. hort. Soc., 1945, 70: 261-70.

A review of the history of the rose in Britain during the last hundred years and a discussion of types and varieties which, in the author's view, will feature prominently in post-war gardens.

383. JOHNSON, A. T.

635.937.34

Some rose hybrids.

J. roy. hort. Soc., 1945, 70: 331-2.

Nevada, Le Rêve, two *Rosa rugosa* hybrids, namely Agnes and Sarah van Fleet, *R. villosa* Wolley Dod, *R. microgosa*, *R. gallica complicata* and *R. dupontii*.

384. BLUNCK, H.

635.937.34: 632.796

Ameisen als Rosenschädlinge. (Ants as pests of roses.)

Anz. Schädlingsskde, 1943, 19: 8-10, from abstract *Zbl. Bakt.*, Abt. II, 1944, 106: 397.

The ant species *Lasius niger niger* and *Myrmica rubra laevinodis* were found to cause damage to a number of rose varieties, particularly by feeding on the buds.

385. VAN DEN BRANDE, F.

635.937.34: 632.793

Een te vreezen rozenvijand. (A serious rose pest.) *Cultuur Hand.*, 1941, 9: 364.

A description of the rose bud and shoot sawfly *Hylotoma rosarium* L. (*Arge rosae* L.) and of the damage it causes. Its eggs are laid in the young shoots in May or June. When the larvae are full grown they leave the rose and pupate in the ground. The larvae of the second generation feed on the rose foliage in August, sometimes causing great damage. The infested shoots should be cut off and an arsenic spray is recommended (arsenic 15 g., soft soap 20 g., dissolved in 2 litres hot water).

386. VAN SLOGTEREN, E.

635.944

De bloembollencultuur en hare technische problemen. Een terugblik—Een blik in de toekomst. (Flower bulb culture and its technical problems, past and future.)

Meded. Inst. Phytopath. Lab. Bloembol. Lisse, 70, 1942, 42 pp.

This is a popular illustrated account of the culture of flower bulbs in Holland, with special reference to the experimental work at Lisse from 1917 to 1941 on diseases and pests.

387. BEYER, J. J.

635.944: 581.145

De terminologie van de bloemaanleg der bloembolgewassen. (The terminology of flower development in bulbous plants.)

Reprint *Meded. Landb.Hoogesch. Wageningen*, dl. 46, verh. 5, 1942, 17 pp.

It is the principal aim of this paper to introduce a new terminology composed of letter symbols, which are the same for the homologous stages of all bulbous plants, and relate to already existing well-known international botanical terms. The symbols are tabulated, with sketches to indicate the stages of development that they represent.

388. PRESTON, I.

635.935.722

Lilies for Canadian gardens.

Mim. (unnumbered) *Canada Dep. Agric.*, 1945, pp. 10.

The pamphlet deals with the culture and propagation of lilies in Canadian gardens and gives a description of a large number of *Lilium* species and hybrids.

389. MAXIMOV, N. A., RAKITIN, G. V., AND TUREZKAJA, R. K.

635.944: 577.16

An attempt to study methods for cultivating gladioli as a new raw stuff for the production of vitamin C.

C.R. Acad. Sci. U.R.S.S., 1945, 47: 116-9, bibl. 3.

The leaves of 40 gladiolus varieties, out of 200 varieties studied in different parts of the U.S.S.R., were found to contain from 1 to 1.7% vitamin C on a fresh weight basis,

which shows them to be almost as rich a source of the vitamin as rose hips and walnuts. The ascorbic acid content of the flowering stems is still considerable, for instance 407 mg. per 100 g. fresh material in the variety Foche, as against 1,190 mg. in the leaves and 268 and 75 mg. in the flowers and bulbs respectively. During the growth of the leaf the vitamin content increases to reach its maximum at the time when the development of this organ ceases, which coincides with the period of mass blooming. There was no difference in vitamin content between plants propagated by large mature bulbs and by the little bulbs (babies) formed at their base. Cultivation trials suggest the following practice: (1) Plant large bulbs in two-row strips, 50 cm. apart, with a distance between the rows of 25 cm. and in the rows of 10 cm. Plant little bulbs in four-row strips, 50 cm. apart, with a distance between the rows and in the rows of 10 cm. and 5 cm. respectively. (2) Planting depth of large bulbs: in light soils about 15 cm.; in medium soils about 12 cm.; and in heavy soils about 10 cm. The corresponding figures for young bulbs are 6-4 and 2 cm. (3) Harvest the green mass after blooming so as to make use of the flowers. Lift the bulbs after the green mass is cut. Large bulbs planted at the distances recommended may be expected to yield about 5-3 tons of leaves and 2-7 tons of stems per hectare or 93 kg. of vitamin C, little bulbs will yield about 84 kg. One hectare of large bulbs will further yield, on the average, a sufficient number of bulbs to plant up 6-5 hectares, while 10-2 hectares may be planted from one hectare of small bulbs.—K.A. Timiriázev Inst. of Plant Physiology.

390. HARTSEMA, A. M., AND LUYTEN, I. 635.944: 581.145
Proeven over het uitloopen van de knollen en het vervroegen van den bloei bij freesia hybriden II. (Tests on the sprouting of tubers in accelerating the blooming of freesia hybrids II.)
Versl. Ned. Acad. Wetensch., 1944, 53: 292-301, being Meded. Lab. plphysiol. Onderz. Wageningen 74, 1944.

In order to prevent non-sprouting of freesia hybrids var. Buttercup, the tubers should be stored during the summer months (after lifting and before replanting) at temperatures from 20° to 31° C. Earliest flowering without "sleepers" was obtained after lifting on 28 May by a treatment of 10 weeks at 31° C. followed by 4 weeks at 13° C. If the tubers were lifted before or after 25 May the treatment at 31° C. had to be extended or shortened, the treatment at 13° C. remaining unchanged. Early flowering was obtained by planting the tubers about 1 September in a greenhouse at 13° C. (14°-16° during the first week, eventually in the dark), then removing them to a temperature of 17° as soon as the first flowers appear.

391. HARTSEMA, A. M., AND LEUPEN, F. F. 635.944: 581.14
Organvorming en periodiciteit van *Amaryllis belladonna* L. (Organ formation and periodicity of *Amaryllis belladonna*.) [English summary.]
Reprint Meded. LandbHoogesch. Wageningen, dl. 46, verh. 4, 1942, 30 pp.+folder of figs., bibl. 19.

Amaryllis belladonna, a bulbous plant from Cape Colony, has a perennial bulb. The foliage appears in spring and dies off at the end of July. The flower stalks appear in September-October. The bulb consists of dried scales, sound scales, a dried flower bud, several series of phyllomes, the remains of flower stalks and a flower bud. Each spring a number of foliage leaves appear. After the last foliage leaf has been split off the growing point proceeds to form the flowers. The inflorescence consists of 2 botryces, each botryx of 8 or 9 flowers, which, however, do not all develop; the total number of flowers that develop varies from 9 to 12. The formation of flowers already begins before the inflorescence of the previous season has appeared. Flower formation occurs once a year and is quickest and best when the bulbs are kept at 23° C.

392. KRIJTHE, N. 635.944: 581.14
De ontwikkeling der knoppen van enkele voorjaarsgewassen. III. (*Galtonia candicans* Dene en *Anemone coronaria* L.) (The development of the buds of certain spring plants.)
Meded. Lab. plphysiol. Onderz. Wageningen, 63, 1940, 26 pp., reprinted from Meded. LandbHoogesch. Wageningen, dl. 44, verh. 6, 1940.

This paper consists mostly of a number of beautiful executed drawings showing the stages of development from the resting bulb (*Galtonia*) or rhizome (*Anemone*) to unfolding of the flowers, with detailed descriptions of parts shown.

393. HARTSEMA, A. M., AND LUYTEN, I. 635.944: 581.145
Snelle bloei van Iris Wedgwood. (Early flowering of Dutch irises var. Wedgwood.) [English summary.]
Proc. Nederl. Acad. Wetensch., 1940, 43: 879, 80, being Meded. Lab. plphysiol. Onderz. Wageningen, 64.

In a number of trials the quickest method of producing good blooms was a preliminary treatment for 3 weeks at 31° C. followed by 6 weeks at 13° C. and then planting out at 13° C.; when a length of 6 cm. was reached the boxes were removed to a greenhouse at 15° C. where flowering started on 10 January (1940). [From authors' summary.]

394. NIJHOFF, J. B., AND HARTSEMA, A. M. 635.944: 581.145
Vergelijking van den eersten bloemaanleg van Iris Wedgwood met Iris Xiphium praecox var. Imperator. (Comparison of the flower primordia of the iris varieties Wedgwood and Imperator.) [French summary.]
Proc. Nederl. Acad. Wetensch., 1939, 42: 808-19, being Meded. Lab. plphysiol. Onderz. Wageningen, 62.

In the earliest flowering Dutch iris, Wedgwood, the flower organs are laid down from about the middle of November to the beginning of January, and in one of the late flowering irises, Imperator, from the middle of January (often during February) until the end of March. It is to be remarked that the bulbs are able to form their flowers during the coldest parts of the year when the temperature of the soil around the bulbs may sometimes descend below zero.

395. BLAAUW, A. H., LUYTEN, I., AND HARTSEMA, A. M. 635.944: 581.145
Snelle bloei van hollandsche irissen var. imperator. III. (Early flowering of Dutch irises var. Imperator. III.) [English summary.]
Proc. Nederl. Acad. Wetensch., 1940, 43: 964-74, being Meded. Lab. plphysiol. Onderz. Wageningen, 65.

Good flowering in the second half of February is warranted if the bulbs are given 4 to 5 weeks of previous heat, which may range from 23° to 28° C.; they are then planted in good soil at a temperature of 9° C. or a little less; when the foliage is at least 6 cm. out of the bulbs, the plants may be transferred to a greenhouse at 15° C. By modifying the previous heating to 1 or 2 weeks at 31° C., flowering may be accelerated to the first half of February or the end of January, sometimes to a still earlier date, but the result is then more uncertain. [From authors' summary.]

396. BLAAUW, A. H. 635.944: 581.145
On the relation between flower-formation and temperature (bulbous irises).
Proc. Nederl. Acad. Wetensch., 1941, 44, 513-20: 684-9, reprinted as Meded. Lab. plphysiol. Onderz. Wageningen, 68, 14 pp.

In the relation between flower formation and temperature

bulbous irises four phases can be distinguished. 1. *The biflorigene phase*: while the bulbs remain under a certain light no temperature treatment can bring about flower formation. 2. *The preflorigene phase*: the bulbs reach such size that under definite conditions flower formation will come possible; temperatures above 17° or 18° strengthen the preflorigene phase, but cannot lead to the florigene phase. 3. *The florigene phase*: temperatures below 17° bring about the florigene phase and at the same time weaken the preflorigene phase. If the preflorigene phase is strong enough regards size of bulb and high temperature, the low temperature is able in the course of many weeks to raise the florigene phase so far that the organs of the flower can be formed. 4. *The flower forming period* will now set in. The low temperatures which formed the florigene phase are also favourable for this flower-origination; if the lower temperature has developed the florigene phase far enough the flower-origination can start and proceed smoothly. [From author's summary.]

97. LUYTEN, I. 635.944: 581.145
De bloemaanleg van *Iris tingitana* Boiss. et Reuter. (Flower formation in *Iris tingitana* Boiss. et Reuter.)
Meded. Lab. Physiol. Onderz. Wageningen, 67, 1942, 28 pp., being reprinted from Meded. Landb.-Hoogeschool Wageningen 46.

Iris tingitana is a native of Morocco. It was chosen as the object of the investigation here described as being one of the parents of the popular early Dutch iris Wedgwood. In order to obtain the true *I. tingitana* the author had material sent direct from central Morocco. The development of the flowers is described and illustrated. The period when the flower primordia are laid down (December-January) coincides approximately with that of the variety Wedgwood.

98. KROMDIJK, G. 635.938.46
De cultuur van winterbloeiende begonia's. (The culture of winter-flowering begonias.)
Cultuur Hand., 1941, 9: 403-6; 1942, 10: 8-10.

The cultivation of winter-flowering begonias is described under the following headings: the begonia as an indoor plant, its history, propagation, the "mother plant", cuttings, suitable soil temperature, potting.

99. VAN MARLE, G. S. 632.654.2: 635.938.46
Aantasting van Begonia's door mijten, behoorende tot het geslacht *Tarsonemus* Can. et Fanz. (Infestation of begonias by mites belonging to the genus *Tarsonemus* Can. et Fanz.)
Tijdschr. Plziekt., 1943, 50: 25-44, bibl. 75.

This paper consists of (1) a description of the symptoms, (2) a description of the most important mite of begonias, *Tarsonemus latus* Banks, (3) the presence of *T. pallidus* Banks on begonias in Holland, (4) the author's observations on *T. latus* on plants other than begonia, (5) a review of the literature on begonia mites, (6) the distribution and host plants of *T. latus*, (7) a note on control measures.

100. VAN MARLE, G. S. 632.654.2
Verspreiding en bestrijding van *Tarsonemus latus* Banks. (The spread and control of *Tarsonemus latus* Banks.)
Meded. [out of series] Rijktuinbouwvoorlichtingdienst Aalsmeer, 1943 ?, 9 pp.

The mite *Tarsonemus latus* Banks is a pest of certain ornamental plants, particularly the begonia. Observations show that the mites easily go from an infested plant to others touching it: infested plants from the cutting bed form foci from which the mites spread. Cuttings from infested parent plants may carry the mite with them. Various methods of direct control were tried during 1941-3; it was

concluded that up to the present the only effective measures have been dusting with sulphur and vaporizing with methyl-bromide; the former is recommended for general use.

401. SEFFINGA, J. 635.944: 631.4
Cyclamenaanmaakgrond. (Composted soils for cyclamens.)
Jaarversl. Proeft. Bloembol Aalsmeer, 1943 (1944), pp. 13-23.

Twenty-four different soil mixtures were used for cyclamen and differences in development recorded. The addition of acid fertilizer to mould gave the best results, superphosphate particularly yielding a marked improvement. Adding leaf-mould improved the quality. Plants in their young stages react more strongly to soil differences than do older plants. The high potash content of stable-manure had a detrimental effect. In acid soil mixtures there was an increase in pH (6.5-7.1) due to the water used (pH 7.0-7.5).

402. VAN SLOGTEREN, E., AND DE BRUYN OUBOTER, M. P. 635.944: 612.8
Investigations on virus-diseases of narcissus.
Meded. Inst. Phytopath. Lab. Bloembol. Lisse, 64, 1944, 18 pp., 32 figs., bibl. 18.

The paper describes experiments on the transmission of virus diseases of narcissus and the application of serological methods for diagnosis. The symptoms of virus diseases in narcissus are, a discoloration of the leaves, yellow stripes, mosaic-mottling, symptoms of necrotic tissues and others, together with the less vigorous growth of the affected plants. Inoculations were made by injecting the juice of diseased plants with a subcutaneous syringe into the leaves of healthy plants, or the sap was rubbed in superficial cuts, or rubbed in with carborundum powder; also healthy and diseased bulbs were longitudinally cut into halves, grafted and sealed with leukoplast. The most successful results were obtained when the inoculations were made towards the end of March or in early April; inoculation made from the middle of June to the middle of July gave negative results. It is more the stage of development of the host plant than that of the plant used as inoculation material that determines the percentage of positive infections. The greater the number of leaves inoculated on a plant the greater are the chances of obtaining infection. Root inoculations gave negative results and there is no evidence that the disease spreads through the soil. Early lifting checks its spread. From circumstantial evidence the black fly, *Doralis fabae* (Scop.) (*Aphis rumicis* L.) is suspected of being a vector. In a brief reference to serological experiments it is stated that they confirmed the results of the inoculation experiments and identified again the varieties mentioned as being affected with the same virus. For controlling the disease the stocks should be inspected very carefully from the very beginning of the growing season and every plant that is only suspected should be removed as soon as possible.

403. COE, D. M. 635.944: 632.8
Gladiolus mosaic.
Wis. Hort., 1945, 35: 114-5.

Gladiolus mosaic is believed to be a virus disease but actual proof is at present lacking. The symptoms are most generally described as breaking of the flower colour, mottling of the foliage, small warty corms and general dwarfing of the plant. On the assumption that the disease is of a virus nature control measures recommended are (1) insect control (aphids, leafhoppers and thrips) by the use of spray or dust insecticides, roguing and isolation.

404. HOPPE, P. E. 635.944: 632.73
Development of spray control for thrips in gladiolus.
Wis. Hort., 1945, 35: 235-6, bibl. 9.

Outlines the work carried out by various workers in North America on the control of the gladiolus thrips.

405. VAN SLOGTEREN, E., AND DE BRUYN OUBOTER, M. P. 635.944: 632.8
Onderzoekingen over virus-ziekten in bloembolgewassen. II. Tulpen. I. (Investigations on virus diseases of bulbous flowering plants. II. Tulips. I.) [English summary.]
Meded. Landb. Hoogeschool Wageningen, 1941, dl. 45, verh. 4, pp. 54, bibl. 35, 62 figs.*

It is pointed out that as far back as 1637 the Dutch bulb-growers already knew how to transmit the symptoms of broken tulips to self-coloured breeder tulips by means of grafting a diseased tulip on a healthy one. The virus disease of tulips is the oldest virus disease mentioned in botanical literature. A description is given of the symptoms in broken tulips and the confusion in the terminology used is criticized. In Holland the chief vector of the disease is *Myzus persicae* and in lesser degree *Macrosiphum euphorbiae* Thomas and *Doralis fabae*. Current season symptoms have been studied by inoculation of tulips in an early stage of development. The influence of environment and climate on the spread of the disease is discussed. All factors favourable for the exposure of the tulips to the attack of aphids and for the development of the latter must increase the danger of the spreading of the disease. Breaking is easily transmitted by cutting the flowers if diseased plants are present in the stocks. The "antithetic virus theory of tulip-breaking" of McWorter is criticized. The authors think it more probable that two closely related strains of the same virus are present than that there should be two different viruses as supposed by McWorter. The use of serological methods for the study of the problem is recommended. For combating the disease it is advised to rogue the diseased or suspected plants before the aphids appear; in Holland they do not appear before the beginning of the flowering season of the tulips. This roguing must take place before the flowers are cut. Stocks not entirely free from infection should not be grown in the neighbourhood of orchards or of crops frequented by the insect vectors of the disease. [From authors' summary.]

406. TIMMERMANS, A. S. 635.944: 632.482
Het botrytis-rot der gladiolen veroorzaakt door *Botrytis gladiolorum* nov. spec. (The botrytis-rot of gladiolus caused by *Botrytis gladiolorum* nov. spec.)
Meded. Inst. Phytopath. Lab. Bloembol. Lisse, 67, 1941, 32 pp.

Botrytis rot of gladiolus, already known for many years, had become more serious since 1937 and warranted investigation. The symptoms of the disease are: large spots covered with a mould soon killing the leaves, small red-bordered, rusty-coloured speckles on leaves and stems, and colourless

spots on the flowers. Through the vascular bundles of stem and leaves the fungus extends to the corms and causes a corm rot. The fungus is considered to be distinct from *Botrytis gladioli* Kleb. and is described as a new species with the name *Botrytis gladiolorum* Timmermans nov. spec. The reasons for the recent severe outbreaks are considered to be the cultivation of more susceptible varieties, the lack of growing of suitable storehouses that can be adequately heated and ventilated, and the weather conditions which have been favourable for the spread of the disease. The fungus is less frequent on corms lifted early than on corms lifted late. By storing at a higher temperature (25°-30° C.) the corms dry quickly and the disease hardly spreads.

407. TIMMERMANS, A. S. 635.944: 632.482
Botrytis gladiolorum nov. spec., de veroorzaker van het botrytis-rot der gladiolen. (*B. gladiolorum*, the cause of botrytis rot of gladioli.)
Meded. Inst. Phytopath. Lab. Bloembol. Lisse, 71, 1942, 6 pp., reprinted from Nederl. kruidk. Arch., 1942, 52: 59-64.

This is a further account, with a description in Latin, of the fungus causing a rot of gladiolus (see previous abstract).

408. a BARROWS, F. L. 635.939.124: 581.145
Seed production in trailing arbutus (*Epigaea repens* L.).
Reprinted from *Wild Flower*, April 1941, pp. 3 + 2 plates.
b HOLLEY, W. D. 635.938.46
Inheritance in *Begonia semperflorens*.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 389-96, bibl. 1.
c MEHLQUIST, G. A. L. 635.936.69
Inheritance in the carnation. V. Tetraploid carnations from interspecific hybridization.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 397-406, bibl. 12.
d PAPE, H. 635.965.23: 632.78
Ein Wickler als Gloxinien-schädling. (*Cnephiasia wahlbomia* as a pest of gloxinias.)
Z. Pflkrankh., 1943, 53: 173-5, from abstract
Zbl. Bakt., Abt. II, 1944, 106: 397.
e PESEL, L. F. 635.937.9
Irisen for the little garden.
J. roy. hort. Soc., 1945, 70: 257-60.
f WESTER, H. V. 634.23
Susceptibility of Yoshino, Akebono and Benihigan flowering cherry trees to spray oil injury.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 412-22, bibl. 10.

CITRUS AND SUB-TROPICALS.

409. BAIN, F. M. 634.3
A brief account of the results of the citrus experiments at St. Augustine Station.
Proc. agric. Soc. Trin. Tob., 1944, 44: 255-76; 1945, 45: 51-65.

Under the soil conditions in the experimental area it is essential to use both organic matter and artificial fertilizers to obtain good growth of citrus. When artificial fertilizers are used without organic matter the trees suffer from deficiencies of the minor elements within a few years. The effect of a balanced manurial treatment is to produce greater growth in the early years and much increased yields in the subsequent fruiting years. Rough lemon has given the most vigorous growth as a stock for grapefruit and oranges. "Wild" grapefruit has shown great variation as a stock. The types of sweet Seville stock are fairly uniform and give results intermediate between those of sour Seville and

rough lemon. The types of sour Seville are extremely uniform. Sour Seville stock is more resistant to gummosis than rough lemon and wild grapefruit stocks. [From author's general conclusions.]

410. OSSERVATORI DE ECONOMIA AGRARIA DI PALERMO E DI PORTICI. (VASSALLO, L., AND PLATZER, F.) 634.334 + 634.342
Le condizioni economiche delle colture del limone e del bergamotto. (The economics of lemon and bergamot orange cultivation in Italy.)
Ann. Osserv. Econ. agrar. Portici, 1940, 5: 179-574.

In this most readable account of Italian citrus-maturing lemon-production the various districts concerned are considered separately. Their limits are Fondi at the southern end of the Pontine marshes in the North to Palermo in the N. West and Siracusa in the S. East of Sicily. Rough details of cultural practice are given in every instance as the systems of farm tenure—whether by owner, farm

* Many of them beautifully coloured.

tenant or on a co-operative basis—are noted. The individual estates are in most cases of about 1 to 3 hectares each, though some round Siracuse and Palermo are much larger. The Reggio Calabria and Messina districts are particularly noted for their high quality Verdeli lemons. Costings are given for 3 or 4 estates in each district.

The bergamot orange (*Citrus bergamia*, Risso) is considered separately. Its zone of cultivation is almost exclusively Reggio Calabria, where the area devoted to it is nearly 4,000 hectares, mostly entirely under bergamot, cultivated purely for its essential oil. Again cultural details are described and costings are presented for a number of holdings.

411. RODANÒ, C. 634.334
Aspetti economici del commercio dei limoni e dei derivati. (Economics of the production of lemons and its derivatives.)
Ann. Osserv. Econ. agrar. Portici, 1940, 5: 575-737.

This article should be read in conjunction with the previous one (*H.A.*, 410) which it can be considered as completing from the statistical and industrial standpoint. Attention is paid to international production and trade in lemons and lemon products. The various branches of the citrus industry in Italy and their connexion with citrus growers are described. World fluctuations in demand for citrus products are noted and numerous figures show exports of such products from Italy to different countries from 1897 to 1934.

412. CHANG-CHIH, H., AND CHIEN-CHI, W. 634.31-1.521
Selection studies of hwang-kuo (sweet oranges) at Kin-Tan and Kiang-Tsing in Szechuan.
Reprinted from *Nanking J.*, 1940 (?), 9: 121-64, bibl. 15.

For a short abstract of part II, which appeared *ibid.*, 1942, 11: 51-72, see *H.A.*, 14: 1317. This introductory paper deals with its subject under the following headings: Introduction, the hwang-kuo of Szechuan, the history of sweet orange culture in Szechuan, the distribution of sweet oranges in Szechuan, the climatic and soil conditions of the sweet orange growing districts in Szechuan, the different strains of hwang-kuo in Szechuan, the characteristics of the Szechuan hwang-kuo, the method of strain selection used, the promising strains of hwang-kuo and their merits. A map shows the citrus growing districts of Szechuan and a large number of photographs—in the majority of cases a cross section, a longitudinal section and two views of the whole fruit—illustrate the types of sweet oranges grown in Szechuan.

413. PARBERY, N. H. 634.3-1.4-1.8
Soil acidity and tree nutrition in Murray River citrus orchards. The effects of cultural treatment.
Agric. Gaz. N.S.W., 1945, 56: 362-6.

In view of the very acid condition of the surface and subsoils of citrus groves at Tocumwal and Barooga, the use of dolomite is desirable. Magnesium sprays are ineffective owing to the difficulty of keeping the precipitated magnesium on the leaves, the poor migration into the leaves and the large amount of magnesium required by the leaves. At Coomealla and Curlwaa, where acidification is related to the zone over which sulphate of ammonia is distributed, intense acidity should be corrected by dolomiting the fertilized portions near the trees. Where acidity is not more than pH 6.0 there is no urgency for acidity reduction. Intense acidity in certain soils has affected the process of nitrification to such an extent that sulphate of ammonia applied to these soils remained unchanged. Magnesium deficiency, in an area where it was not suspected, is of wide occurrence and should be remedied by the addition of dolomite. [From author's conclusions.]

414. FURR, J. R., REECE, P. C., AND HRNCIAR, G. 634.31
Nitrogen absorption of ringed orange trees in sand culture.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 51-4, bibl. 3.

Trials with Parson Brown and Valencia on sour orange stocks showed that ringing which allowed rapid healing reduced N absorption for only a short time. Thus following a single knife cut the absorption rate apparently returned to normal after about 2 weeks. When ringing was so done that the wound could not be repaired a reduction in absorption was noted in the first 5 days and the rate continued to decline or remained at a low level during the rest of the period of observation, viz. 8 weeks. Results are discussed in connexion with those obtained by Hoagland and other workers.

415. CAMERON, S. H., AND COMPTON, O. C. 634.31: 581.192
Nitrogen in bearing orange trees.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 60-8, bibl. 5.

Analytical data are presented on nitrogen content in 36 bearing Valencia orange trees excavated over a 2-year period at intervals of 3 weeks. Among other facts noted are the following:—nearly half the nitrogen is in the leaves, about one-tenth in the twigs and shoots, a quarter in the branches and trunk—about half of this being in the bark—and rather less than one-fifth in the roots. A maximum N content occurs just prior to the initiation of new growth in the spring and a minimum in mid-summer. More detailed studies are in progress to determine the effects of blossoming, fruit production, etc., on nitrogen content.

416. CAMERON, S. H., AND SCHROEDER, C. A. 634.31: 581.192
Cambial activity and starch cycle in bearing orange trees.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 55-9, bibl. 6.

Observations, microscopical and microchemical, were made on material from full bearing sweet orange seedlings and from Valencias using phloroglucin-hydrochloric acid and safranine and fast green for the studies of cambial activity. Cambial activity was found to be first evident in the spring in twigs and small branches which bear new shoot growth. In other parts initiation is very irregular but appears to depend on relatively slow basipetal progression. In above ground parts cessation of cambial activity is in basipetal sequence, but in the roots it is acropetal, i.e. the opposite of that of initiation. Fluctuations in starch are confined to tissues close to the cambium and to parts close to actively growing shoots or roots. Other parts always contain large quantities of starch. Heavy fruiting results in reduced starch content in the above ground parts mainly in the twigs and small branches.—Los Angeles, California.

417. REECE, P. C. 634.31: 581.46: 631.55
Fruit set in the sweet orange in relation to flowering habit.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 81-6.

Observations show that leafy inflorescences in the sweet orange carry much more fruit than leafless inflorescences, and that whether the inflorescence is leafy or leafless, the percentage of total fruit set increases with proximity of the inflorescence to the end of the twig. It remains to be shown what factors influence the type of bloom and what specific cultural operations can best be used to shift it towards more numerous leafy inflorescences.—Orlando, Fla.

418. SOUTHWICK, R. W. 634.3-2.191
Pressure injection of iron sulphate into citrus trees.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 27-31.

Trials in Ventura County, California, where in general soils

and irrigation waters are somewhat high in calcium, show that liquid pressure injections of ferrous sulphate at strengths of 50 to 100 grams per tree will correct chlorosis for two to four years, with an even distribution of iron throughout the tree. This method occasionally causes severe injury to the small twigs of a tree.

419. HAAS, A. R. C. 634.3: 546.27
Boron in citrus trees.

Plant Physiol., 1945, 20: 323-43, bibl. 27.

Gum was sometimes found in the peel of lemon and orange and also about the core in orange fruits produced by trees grown in solution cultures lacking boron. The vessels of the woody tissues in such trees were often filled with gum; exudations occurred at cut surfaces and in some cases the gum protruded through the bark. Gum was exuded from the exposed surface of the pedicel when flowers or fruits were detached. It also occurred between the cells in leaves and was involved in leaf distortion. Translucent spots frequently preceded the corky splitting of leaf veins and often the terminal meristematic tissue or growing points in twigs was destroyed. The turmeric method was found accurate and rapid for determining small amounts of boron in citrus. Orange juice varied in its boron content according to the location of the trees from which the fruits were obtained. In comparison with orange juice, the boron content of grapefruit is low. Decreasing the pH of the soil or increasing the deficiency of other elements such as N and K increased the accumulation of boron in citrus leaves. [From author's summary.]

420. HAAS, A. R. C. 634.3-1.541.11: 546.27
Boron content of citrus trees grown on various rootstocks.
Soil Sci., 1945, 59: 465-79, bibl. 16.

This paper deals with rootstock as it affects the accumulation of boron in the fruit, leaves, and bark of citrus trees growing in experimental plots under closely comparable soil, cultural and climatic conditions. The method of sampling is described. The leaves of like scions vary in their boron content according to the rootstock variety. The boron content of the flowers was reduced when the boron supply was made inadequate. In the dry matter of lemon and grapefruit flowers the water-soluble boron was lower than in orange flowers. The boron content of the peel of Valencia oranges from trees on sweet and sour rootstocks was slightly less than when other rootstocks were used. The water-insoluble boron content of the dry matter of Valencia orange leaves of trees on various rootstocks is remarkably uniform. Large differences occur in the water-soluble and in the total boron content, and these differences are definitely related to the rootstock variety. The effect of the rootstock on boron in scion leaves is slightly greater for sweet than for sour orange rootstocks, and the effects are greater for lemon and grapefruit than for the leaves of navel or Valencia orange scions.

421. HODGSON, R. W. 634.3-1.542
Pruning with reference to the old citrus orchard problem.

Calif. Citrogr., 1945, 31: 40.

The author discusses the effect of time of pruning, severity of pruning, and degree of restriction of growing points (shoots). Two types of treatment are being used: preventive pruning (on 15-year-old trees) and restorative pruning (on large old trees). Preventive pruning appears to offer the greatest promise; it does not result in reduced size of tree, of bearing surface, or of crop, and does not involve a material increase in maintenance costs. Restorative pruning may vary from a single severe deadheading to a gradual reduction in height over several years. Another approach to the problem is orchard thinning which may consist of outright or progressive removal of part of the trees; for crowded trees with shaded-out side-walls this appears to improve the bearing of the remaining trees.

422. BAIN, F. M. 634.337-2.19
A progress report on the dying of limes.

Proc. agric. Soc. Trin. Tob., 1945, 45: 123-49, bibl. 5.

The first sign of so-called root disease is usually a yellowing of tips and around the margins of the leaves of one or two branches; these leaves subsequently fall and the fruit dries and shrivels, often without dropping. The affected branch is connected by a strip of dead bark running down the trunk to a dead root which, when dug out, is almost invariably devoid of bark. This strip of dead bark is underlain by a strip of dead wood. The feeding rootlets on a main root are the first to die off, the dying of tissues then proceeding to the main root and thence back to the trunk, finally reaching the branch. Shade, wind protection and contour draining assist in retarding or preventing the onset of the disease. Leaf analyses have shown higher nitrogen and potash for healthy areas as against diseased, and a narrow nitrogen-potash ratio for healthy areas as against diseased. The evidence obtained suggests that the condition results from a lack of balance between growth period and dormancy.

423. KIELY, T. B. 634.3-2.4
Diseases of citrus.

Agric. Gaz. N.S.W., 1945, 56: 391-4.

The diseases discussed, with special reference to their control, are black spot (*Phoma citricarpa*), melanose, lemon scab, exanthema and sooty blotch.

424. KLOTZ, L. J., AND PARKER, E. R. 634.3-2.4
Suggestions for controlling brown rot, exanthema, and septoria spot of citrus.
Calif. Citrogr., 1945, 31: 20.

For the control of brown rot (*Phytophthora* spp.) it is suggested that only the skirt of the tree to a height of 3 feet be sprayed in late October or early November, or earlier in the rainy season is earlier, with 5-1-4-100 zinc-copper-lime. This spray, if applied to the entire tree, is effective against septoria spot, mottle leaf, and probably exanthema.

425. GODFREY, G. H. 634.3-2.3/4
A gummosis of citrus associated with wood necrosis.
Science, 1945, 102: 130.

Investigations carried out for the past 7 years indicate that the most serious citrus disease of the Lower Rio Grande Valley district, Texas, is a type of gummosis. Gummosis arises from cracks in the bark connected with irregular bands of necrotic wood, the greater part of which lies beneath the outer wood layers. Sections show that the longitudinal extension of the necrotic band, both upward and downward in the trunk or branch, is usually several times the lateral spread. Histological studies disclosed the presence of hyphae and spores of extremely small diameter suggestive of an *Actinomyces*. All attempts to isolate the organism have thus far failed, but necrotic bands and gummosis could be artificially produced by inoculating healthy wood with what the author calls pink border wood. Hence, the parasitic origin of the disease may be regarded as proved. Spread is at times rapid, in one case under observation 1½ feet downward in 30 days. The type of gummosis described occurs commonly in sweet orange, grapefruit and the Meyer lemon. The sour orange rootstock appears to be immune, since the downward spread stops at the union. Points of entrance into the wood are all sorts of cracks and wounds.—Lower Rio Grande Valley Experiment Station, Texas.

426. FREZZI, M. J., AND MACOLA, T. 634.3-2.411
La podredumbre del pie de los citrus en la provincia de Córdoba, Argentina. Importancia, etiología y medios de lucha. (Foot rot of citrus in the province of Córdoba, Argentina. Importance, etiology and means of control.)
Rev. argent. Agron., 1945, 12: 203-11.

Associated with foot rot of *Citrus* spp. in Argentina and

free species of *Phytophthora*, viz. *P. parasitica* Dastur, *Phytophthora* (Sm. and Sm.) Leonian, and *P. palmivora* Butler. The last named was isolated by the authors only on citrus fruits with a brown rot, but it had previously been shown to be one of the causes of foot rot. The geographical distribution of the three species within the public, as ascertained by isolations, is given. Possible means of control are outlined: (1) the use of resistant potstocks. Until recently it was thought that the bitter orange (*Citrus aurantium* var. *amara* L.) would serve this purpose but it has been found to be very susceptible to a foot rot; some success has been obtained with a variety of sweet lime (*C. aurantifolia* Sw. var. *Rangpoor*); (2) preventive measures, such as the use of fresh soil and the avoidance of deep planting; (3) curative treatment, by removing the soil round the base of the trunk, cutting off all dead roots, scraping off diseased bark from the trunk, and painting the exposed parts with a disinfectant.

27. SMITH, A. J. 634.3-2.73

Control of citrus thrips in western Transvaal.

Fmg S. Afr., 1945, 20: 753-60.

As a result of four big orchard experiments, conducted in the western Transvaal to determine the relative efficiency of tartar emetic (Tartox), Citrometic and sulphur dust against citrus thrips, the use of Tartox is recommended at concentration of 2 lb. per 100 gal. water plus 2 lb. sugar and applied at the rate of 1-2 gal. per tree at the time of complete petal fall. A single application will suffice, unless rains heavily within 3 days after spraying or a heavy thrips infestation occurs later in the season. It is emphasized that these recommendations apply to the western Transvaal only.

28. WOGLUM, R. S. 634.3-2.951

Present use of copper sprays on citrus.

Calif. Citrogr., 1945, 30: 376.

Severe injury from the use of copper sprays has occurred during the last two seasons. The injury has consisted of leaf pitting, especially on the underside, leaf drop, fruiting and twig dieback, often with gumming; the damage is now confined to the sprayed parts—in skirt spraying the top of the tree escaping injury. The more severe damage has been largely confined to trees completely covered by spray, as in copper deficiency treatment. Lemons, oranges and grapefruit have all shown susceptibility. The best brown rot (*Phytophthora* spp.) formula for the past season was 1-5-4-100 (1 lb. copper sulphate, 5 lb. zinc sulphate, 4 lb. hydrated lime to 100 gal. water) and this is at present recommended.

29. KLOTZ, L. J., AND MIDDLETON, J. T. 634.3-2.951

Notes on copper spray damage to citrus trees.

Calif. Citrogr., 1945, 31: 14-6.

This article has special reference to the severe damage to citrus trees from applying copper-containing sprays during the past two seasons (see previous abstract), and discusses the causes. There are at least three ways in which copper sprays can damage trees, 1. by releasing an excess of soluble copper, 2. by increasing transpiration and drying of the tree, thus hastening wilting and leaf drop, 3. by lowering the temperature and increasing frost damage. With regard to the first, dull, overcast, cool weather results in a lowered use of carbon dioxide due to restricted photosynthesis, causing an accumulation of carbon dioxide which causes an increase in soluble copper. Cold makes carbon dioxide more soluble in moist plant surfaces. The sugars of honeydew from aphids and from black and cottony cushion scales can bring copper into solution. Recommendations for fall spraying are: Spray early (November) with 1-1-100 Bordeaux with 5-1-5-100 zinc-copper-lime. Cover only the skirts of the trees, unless for exanthema or septoria for which the entire tree is sprayed. Among the new organic fungicides to hold some promise are, dithane, spargon, and zerbate-liban.

430. PARKER, E. R., MIDDLETON, J. T., AND VANSELOW, A. P. 632.951

Neutralizing materials for copper sprays.

Calif. Citrogr., 1945, 31: 56-60, bibl. 3.

This article discusses the effects of lime, soda ash, zinc and manganese on copper solubility.

431. ZIKÁN, W. 632.7: 633/634

Notas sobre *Lonchaea pendula* (Bezzi) (Diptera) e *Belonuchus formosus* Gravenh. (Staphylinidae, Coleoptera). (Notes on *Lonchaea pendula* and *Belonuchus formosus*.)

Bol. Minist. Agric. Rio de J., 1943, 32: 9: 1-10.

The author has studied the biology, particularly with reference to oviposition of *Lonchaea pendula* (Bezzi) which is considered to be one of the chief pests of oranges and cassava; a list of its host plants is given. There is a brief note on *Anastrepha manihoti* Costa Lima reared from shoots of cassava; up to that time it had been found only on the fruit of that plant. *Belonuchus formosus* Gravenh. is considered to be a beneficial insect in that it devours the larvae of fruit flies. *Leptoglossus gonager* is recorded as attacking choco (*Sechium edule* Sw.) for the first time.

432. HOLLAR, V. E., AND HABER, E. S.

633.492-2.19

Factors related to stem-end shrink of the sweet potato.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 359-69, bibl. 7.

A description is given of the phenomena connected with this physiological disorder in sweet potato, and the relation to the trouble of various cultural practices is discussed.

433. DE LA HUERTA, A. 633.526.23

El henequén (su cultivo en la zona subtropical de la Península Ibérica). (Sisal cultivation in the subtropical zone of the Iberian Peninsula.)

Bol. Inst. nac. Invest. agron. Madrid, 1944, No. 11, pp. 318-55.

The paper begins with a description of the subtropical zone in the Iberian peninsula and a justification for recommending the cultivation there of the sisal hemp, *Agave rigida* var. *sisalana*. The plant, its propagation and cultivation are described. The climate and soil of Malaga (Spain) are compared with those of Merida in Mexico, the original home of the plant. The properties and applications of the fibres are mentioned.

434. MACEDO, A. 633.526.23

Doenças do agave. (Diseases of sisal hemp.)

Bol. Minist. Agric., Rio de J., 1943, 32: 7: 27-8.

Brief notes on diseases of sisal caused by fungi in South America, i.e. *Colletotrichum agaves* Sacc., *Dothidea parryi* (Farlow) Theis, *Lembosia dendrochili* Lev., *Marssonia agaves* Earle, *Septoria megalospora* Speg., *Tubercularia agaves* Pat., *Gloeosporium agaves* Sydow, *Pleospora* sp., *Phyllosticta* sp. and *Didymaria* sp.

435. MENDES, P. T. 633.85-1.523

Nota preliminar sobre a hibridação do tungue.

(Preliminary note on hybridization of tung.)

Rev. Agric. São Paulo, 1945, 20: 274-6.

In order to obtain varieties of tung more suited to the climate of the São Paulo province than the commonly grown *Aleurites fordii* the author crossed this species with *A. montana*. Fifty-two seeds were obtained and 10 seedlings raised. At first these plants showed predominating characters of *A. montana*, but later their characters were more intermediate between those of the two parents. The new varieties are being tested in various regions of the province.

436. WOOLLEY, F. 633.85

O tungue (*Aleurites fordii*). Espaçamento das arvores. (Tung oil. Spacing the trees.)

Rev. Agric. São Paulo, 1945, 20: 131-9.

The author reviews, mostly by quotations, the recommendations of various authorities on the spacing of tung trees.

He emphasizes that the ideal distance for planting is that which avoids interlacing of branches or of roots during the economic life of the plant, so making the best use of the ground and of green manuring to maintain the fertility of the soil. For the plantations of São Paulo and Paraná (Brazil) he recommends planting in squares 12×12 metres with an extra tree in the middle of the square; at the end of 10 or 12 years, before the branches of neighbouring trees begin to touch, the central tree of the square should be removed.

437. LOUSTALOT, A. J. 633.85-2.19 : 546.56 + 546.47
Effect of copper and zinc deficiencies on the photosynthetic activity of the foliage of young tung trees.
Plant Physiol., 1945, 20: 283-8, bibl. 12.

Copper and zinc deficiencies were definitely associated with a reduced rate of apparent photosynthesis in leaves of young tung trees. The amount of reduction was less in the case of zinc deficiency than for copper deficiency as they occurred in this experiment. There was a highly significant reduction in carbon dioxide assimilation even with normal-appearing leaves on deficient plants. The highest rates of photosynthesis in the fall occurred about the middle of October and were associated with favorable weather conditions. As a rule the rates were higher in the mornings than in the afternoons. [Author's summary.]—U.S. Field Lab. for Tung, Gainesville, Fla.

438. NIXON, R. W. 634.62
Dates in the United States.
Amer. Fruitgr., 1944, 64 : 12 : 9, 24, 26-7.

The date industry in the United States has grown from a production of only one million pounds weight in 1926 to 16 million pounds in 1943. The centre of commercial date culture is Coachella Valley, California, where are 80% of the approximately 3,800 acres of dates in the United States, of which 3,300 are in California and an estimated 500 in Arizona. The difficulties associated with date cultivation are discussed, one of them being that the date palm, unlike most other kinds of fruit trees, cannot be budded or grafted. Varieties can be propagated only by the offshoots or suckers that are produced in the axils of the leaves mostly during the early years of the palm's life. Young palms should produce a small commercial crop the fifth year after planting and reach full production of 100 to 300 lb. per palm at 10 to 15 years according to variety and cultural conditions. The writer states that the industry has now passed the experimental and promotional stages and appears to be on the verge of a period of normal, steady growth based on past experience and future market trends.

442. BIRDSALL, B. J. 633/635: 551.566.1
Informe sobre la Estación Experimental Agrícola Cooperativa en Tingo María Perú. (Report on the Cooperative Agricultural Experiment Station of Tingo María, Peru.)
Colonias Foresta Peru, 1945, Nos. 5 and 6, pp. 1-64.

This number is devoted to an account, with many illustrations from photographs, of the site, buildings and the activities of the experimental station at Tingo María, near the centre of Peru. Parts describing the work carried out there on horticultural and plantation crops are, *Hevea*, pp. 20-25 (including 6 photographs showing the method of grafting); quinine, pp. 26-32; plants yielding insecticides (*Derris*, *Pachyrhizus* and *Lonchocarpus*), pp. 37-39; citrus species, avocado, mango and banana, pp. 41-42.

443. HARDY, F., AND EVANS, L. J. C. 631.8: 551.556.1
The College permanent manurial experiment.—Continued.
Trop. Agriculture, Trin., 1945, 22: 128-37.

The object of the experiment and the responses of 18 crops

439. NIXON, R. W. 634.62
The need for a monograph of the date varieties of the world.

Chron. bot. (Calendar), 1945, 9: 153-4.

It is urged that a systematic study of the date varieties occurring in the Old World would be an invaluable contribution to the advancement of a breeding programme in the American south-west.

440. ALDRICH, W. W., LEACH, G. H., AND DOLLINS, W. A. 634.62-1.5
Some factors influencing the growth of date offshoots in the nursery row.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 215-21.

The very much higher mortality of non-rooted than of rooted (Zahidi) offshoots is in agreement with the results of Crider and with commercial experience in the United States. With rooted offshoots the experimental conditions that resulted in increased offshoot survival were (a) the use of medium or large, rather than of small Deglet Noor offshoots; (b) avoidance of sufficiently frequent irrigation or relatively water-impervious soil to cause water to stand on the surface either half or nearly all the time, and (c) planting unwrapped Khadrawy offshoots in April, June, or July instead of in February. Leaf extension of rooted offshoots was favored by these three experimental conditions and also by (a) immediate planting, as compared with a 5-day delay; (b) planting in June or (in the case of unwrapped shoots) in April rather than in February; (c) reducing to two the number of offshoots per palm, instead of allowing 10 to 15 to remain on the parent palm during 18 months prior to cutting and planting; (d) a 2- or 3-day interval between irrigations of a pervious fine sand, as compared with a 10-day interval; and (e) no wrapping of vigorous Khadrawy offshoots as compared with wrapping with burlap. These results substantiate many of the recommendations of Albert and Hilgeman but raise some doubt as to the practices of wrapping offshoots or of cutting offshoots, at least of the Deglet Noor variety, until they have attained a weight of over 30 lb. [From authors' summary.]—Indio, California.

441. a TURRELL, F. M., CARLSON, J. P., AND KLOTZ, L. J. 634.3
Surface and volume determinations of citrus fruits.
Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 159-65. Riverside, California.

TROPICAL CROPS.

to different manurial treatments were discussed in the first paper of the series (*ibid.*, 1941, 18: 48-61; *H.A.*, 11: 546). The responses to ten further crops, including canavalia, sweet potato, yams, woolly pyrol and Bengal bean, subsequently grown during the period 1937-43, are the subject of the present paper. Numerous large tables show the experimental results obtained, from which the following main conclusions are drawn: (1) The original limed dressing has not had any beneficial effect on crop yield. (2) Where organic manure is used without inorganic manures, the lime appears to have exerted a depressing effect. (3) Where artificials are used in the absence of organic manure the effect of lime has been variable. (4) Deficiency of potash is the most important limiting factor to crop production on College Farm soils. Omission of potash from the dressings of artificial manures results in a very appreciable loss in yield. (5) Phosphate deficiency is not likely to occur here, and inclusion of phosphate in manurial dressings has on the whole given disappointing results. (6) Although lack of nitrogen appears most serious than lack of phosphate, yet losses due to the omission of nitrogen from the mineral mixture have been surprising.

all. (7) Comparison of organic with inorganic manure shows that the former has produced higher yields than the latter. It seems possible, therefore, that the organic dressing still possesses more than the equivalent amount of plant nutrients contained in the inorganic dressing; or that the value of the organic manure does not lie only in its content of plant nutrients. (8) Where both organic and inorganic manures are applied together, the best results are obtained when a complete artificial dressing is applied in conjunction with the organic." The effect of the different manural treatments on nutrient and organic matter content of the soil and on soil reaction are also discussed.—Imperial College of Tropical Agriculture, Trinidad.

4. BALLE, S. 586.222
Revision des Piperaceae du Congo belge. (Revision of the *Piperaceae* of the Belgian Congo.)
Bull. Jard. bot. Brux., 1942, 16: 367-405.

Description with keys of species of *Piper* and *Peperomia* occurring in the Belgian Congo.

5. GREGORY, L. E., AND VAN OVERBEEK, J. 631.535.4

An analysis of the process of root formation on cuttings of a difficult-to-root *Hibiscus* variety.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 427-33, bibl. 7.

The reasons for the rooting and non-rooting of *Hibiscus* cuttings treated in different ways are discussed at some length. For previous work on the material see *H.A.*, 1941.

6. PARSONS, T. H. 635.977

The flowering trees of America.

Trop. Agriculturist, 1945, 101: 27-30.

Notes on four fine species of *Tabebuia* growing as ornamental flowering trees in the Royal Botanic Gardens, Peradeniya, Ceylon: *Tabebuia guayanae* Hemsl., *T. argentea* Britton, *T. serratifolia* (Vahl) Nichols and *T. rosea* D.C.

7. TELFORD, E. A., AND CHILDERS, N. F. 631.459

Tropical kudzu.

Agric. Amer., 1945, 5: 210-1.

Definite need has been felt in Puerto Rico for a vigorous vine which would cover the ground thoroughly and quickly from seed, thus helping to control hillside and gully erosion and at the same time adding organic matter and nitrogen to the soil. Kudzu bean (*Pueraria hirsuta*) does not do well in Puerto Rico, but tropical kudzu (*Pueraria aseoloides*) is proving highly satisfactory. It competes successfully with such grasses as nut (*Cyperus rotundus* L.), carpet (*Axonopus compressus* (Swartz) Beanv.), guinea guineum (*anicum maximum* Jacq.), molasses (*Melinis minutiflora* (L.) Rav.), and malojillo (*Panicum purpurascens* Raddi). Tropical kudzu is not particularly exacting in soil requirements and its cultivation is easy. With regular rains it would thoroughly cover the ground in 5 to 6 months and come deeply rooted by the beginning of the dry season.

8. ANON. 632.4

Plant diseases. Notes contributed by the Biological Branch.

Agric. Gaz. N.S.W., 1945, 56: 503-5.

Descriptions of the symptoms and measures of control of coprosia leaf spot (*Cercospora musae*) and speckle (cause known) of bananas, and of brown spot of passion fruit (*Alternaria passiflorae*). Brown spot of passion fruit may be very destructive in commercial plantations; severe infection often terminates the life of a plantation.

9. ILLINGWORTH, F. 632.96

The battle against insect pests.

J. Jamaica agric. Soc., 1945, 49: 23-5.

The author cites instances of the dispersal of serious insect pests by human agency and discusses the biological control of insect parasites.

450. KNIGHT, P.

Insect problems of Peru's Sierra.

Agric. Amer., 1945, 5: 207-9.

What to do about the insect pests of its Sierra region is one of Peru's major problems. Extended research has been carried on in connexion with the cotton and sugarcane pests of the coastal haciendas and contributions have been made toward an understanding and control of the insects which attack potatoes, small grains, fruits and minor crops of the Sierra. One of the difficult problems of this region is the control of migratory locusts, especially the widely distributed *Schistocerca paranensis*, which is a major locust pest in many localities from southern Mexico to northern Argentina. The potato tuberworm (*Gnorimoschema operculella*) occurs generally throughout the Andes, where it is the most destructive species attacking the tubers; this insect and a number of weevils are known as potato borers.

451. VAN DEN BRANDE, J. 632.6/7(675)

De biologische bestrijding der schadelijke insecten in Belgisch Congo. (The biological control of injurious insects in the Belgian Congo.)

Meded. Landb.Hoogeschool. Opzoek. Stat. Staat Gent, 1940, 8: 188-96, bibl. 8.

The author reviews the biological control of insect pests with special reference to its application to the protection of crops in the Belgian Congo. He suggests that certain predators and parasites should be introduced immediately, e.g. ladybirds, and the parasites of the transparent coconut scale, and of the red cotton stainer bugs. The indigenous predators of the banana weevil should be compared with *Plaesius javanus*, as well as the indigenous parasites of thrips with those of other areas. [From author's summary.]

452. STARR, D. F. 632.77

The action of a repellent spray against the Mexican fruitfly.

J. agric. Res., 1945, 71: 415-22.

In previous tests with repellent sprays against the Mexican fruitfly (*Anastrepha ludens* (Loew)) in Mexico, the traps in sprayed trees sometimes yielded more flies than comparable traps in unsprayed trees, although the repellent seemed to provide protection to the fruit, and an experiment was undertaken to test this apparent contradiction. Traps containing a fruitfly lure were set out in two mango trees, and one tree was sprayed about once a week from 27 March to 30 June, while the other tree was left unsprayed. The flies caught in the trap were counted before each spraying and at various intervals (usually 3 to 5, 9 to 11, and 27 to 29 hours) after spraying, and the ratios of the counts in the two trees were analysed statistically. The repellent action was found to pass through two phases in its effect on the trap catch—a negative phase following the application of the repellent, during which the catch in the sprayed tree was lower than in the unsprayed tree, and a positive phase in which the catch in the sprayed tree was above normal. Uniformity trials run when the catches had returned to equilibrium after an application indicated that the differences were due to the action of the repellent and not to natural variation. A comparison of infestation in fruits from the sprayed and the unsprayed tree showed that the spray probably provided some protection to the fruit. [From author's summary.]

453. JACOBY, M. 632.752

Observações e experiências sobre *Atta sexdens rubropilosa* Forel visando facilitar seu combate. (Observations and experiments on *Atta sexdens rubropilosa* Forel with a view to effecting its control.)

Bol. Minist. Agric. Rio de J., 1943, 32: 5: 1-54.

This is an account of the habits of one of the leaf-cutting ants particularly with regard to the construction of the nest and the difficulties encountered in combating the insect. The structure of the chambers containing the "fungus-gardens"

is illustrated by drawings, and the ingenious method of securing ventilation is described. By changing the fungi between *Atta sexdens rubropilosa* and *Acromyrmex disciger* it was established that these two ants are cultivating different fungi. Of the various poisons tested against the ant only gases were successful and of these prussic acid was the best. It is not advisable to close the openings of the nest when introducing the gas.

454. HENDRICKX, F. L. 632.729: 632.96
Une épidémie fongique du criquet *Zonocerus variegatus* L. due à *Empusa grylli* (Fres.) Nowak.
(A fungus disease of *Zonocerus variegatus* due to *Empusa grylli*.
Rec. Commun. I.N.E.A.C. 1, 1943, pp. 16-20, bibl. 6.

There seems to be little hope at present that the fungus disease of *Zonocerus variegatus* described by the author is of any practical value in its control.

455. CALLAN, E. McC. 632.729
Observations on mole crickets and their control in Trinidad, B.W.I.
Trop. Agriculture, Trin., 1945, 22: 146-9, bibl. 8.

The mole cricket species *Scapteriscus vicinus* is a major pest of vegetables and lawns in Trinidad, showing among the former a special preference for recently transplanted tomatoes, cabbages, cauliflowers and others. Control in vegetable gardens may be effected by the use (1) of protective collars: large tough leaves, for instance of mammee apple, 9-10 in. long, 3-4 in. wide, or waxed paper or metal cylinders, 3-4 in. high, 2½ in. in diameter, buried in the soil around the seedling or young plant to a depth of 2-3 in.—or (2) of poison bait: 6 oz. of sodium or barium fluosilicate to 5 lb. of bran or crushed grain, applied at the rate of 20-30 lb. of the dry bait per acre. On lawns mole crickets should be controlled by watering a carbon disulphide solution directly into the lawn. This will bring the pest to the surface, where it can be collected and destroyed.—Imperial College of Tropical Agriculture, Trinidad.

456. BASTOS DE MENEZES, O. 633.37
Estudos para a genética do Guando. (Genetical studies of the pigeon pea.)
Bol. Minist. Agric. Rio de J., 1943, 32: 10: 69-83.

The geographical distribution of the pigeon pea, *Cajanus indicus* Spreng, is outlined. The structure of the flower is described and illustrated. The form is typical for self-pollination but cross-pollination is possible either by insects (frequently), or rarely by the wind. The pollinating insects (hymenoptera) pierce the carina to obtain nectar and carry away grains of pollen on their mouth pieces to other flowers. The method of artificial cross-pollination and the mechanism of fecundation are described.

457. McCLURE, F. A. 633.584.5
Bamboo in Ecuador's Lowlands.
Agric. Amer., 1945, 5: 190-2, 194.

The principal use made of bamboo in Ecuador is in the building industry. Bamboos are rarely cultivated in Ecuador; in the areas where they flourish, their natural growth supplies both the existing local needs and the demand from outside. Instances of their cultivation are quoted, however. Mention is made of *Guadua angustifolia*, *Heliconia bifax* and *Carludovica palmata*. A number of species of bamboo from China, Japan, India and Java recently introduced into Ecuador were selected specially for the superior quality and technical versatility of their culms and for their relatively low susceptibility to attacks of the powder post beetle. The plants have been set out for trial at the Estación Experimental Agrícola del Ecuador.

458. POSNETTE, A. F. 633.689-2.8
Root-rot of cocoyams (*Xanthosoma sagittifolium* Schott).
Trop. Agriculture, Trin., 1945, 22: 164-170, bibl. 5.
Ordinary cultural methods do not reduce the incidence of

root-rot. Roguing of all wild cocoyams immediately after clearing the bush, and then replanting with healthy seedlings, delays the disease so that one crop may be obtained. A satisfactory yield may be obtained by controlling bush shade without clearing or disturbing the soil. Cocoyams in bush are not immune. Infected plants may carry the disease sometimes they recover when planted in uninfected soil, but the recovery may be temporary. The disease may be carried by corms which have been surface-sterilized and all roots removed. The disease may be transmitted by gently rubbing an extract of apparently healthy roots from a diseased plant with carborundum powder on the roots of healthy plants and by grafting together leaf petioles. These experiments suggested that the disease is caused by a virus. Of the varieties tried only *Xanthosoma violaceum* var. Yautia Palm is resistant.

459. TEIXEIRA MENDES, J. E. 633.73
Semelhanças e diferenças entre a lavoura cafeeira de Santa Catarina e a da Colômbia. II. Tamanho da propriedade. (Similarities and differences in the cultivation of coffee in Santa Catharina and in Colombia. II. Size of the estate.)
Bol. Superintend. Serv. Café, São Paulo, 1945, 20: 522-31.

This is a description (with 4 figures from photographs and 1 map) of the distribution of the coffee estates in the State of Santa Catharina, Brazil. Coffee cultivation is restricted to two coastal zones—the littoral region of Serra do Mar (for the most part) and the plains near the sea. The coffee estate in Santa Catharina is very small relative to the number of coffee trees on it, thus resembling cultivation conditions in Colombia.

460. RIBEIRO, O. 633.73-1.531: 535.21
Efeito das radiações ultra-violeta e infra-vermelha sobre as sementes do café. (The effect of ultra-violet and infra-red rays on coffee seeds.)
Bol. Minist. Agric. Rio de J., 1943, 32: 1: 53-7.

The experiment described was carried out with the object of obtaining information on the effect of solar radiation on coffee seeds during the period that they remain dry in the soil. Ultra-violet rays were obtained from a mercury vapour lamp with dark crystal for filter, and infra-red rays from a metal filament lamp of 500 watts with a paraboloid reflector and a red glass filter. Tests were first made on soy a bean and maize seeds without injury with exposures of 1, 2, 3, 4 and 24 hours. Coffee seeds were then exposed to the radiation for periods of 1 day for 4 hours, 3 days for 2 hours, 6 days for 4 hours, and 16 days for 4 hours; they received no injury from the ultra-violet rays, but some injury from the longer exposures to infra-red rays, 16 days for 4 hours resulting in no germination.

461. GILBERT, S. M. 633.73-1.542
The multiple stem system of growing *Coffea arabica*.
Pamphl. Tanganyika Dep. Agric. 39, 1945, pp. 7, 50 cents.

The pamphlet presents a summary of experimental results obtained at the Coffee Research Station, Lyamungu, Moshi (and published in its annual reports) in relation to the multiple stem system of growing coffee under the following headings:—Introduction; single stem versus multiple stem coffee—the pros and cons; the multiple stem system from nursery stage; conversion of single stem to multiple stem coffee; pruning and handling of multiple stem trees; conversion to a new cycle. Three pages of drawing illustrate the description of methods used.

462. DE MELLO, A. T. 633.73-1.536
Mudas sem torrões. (Transplanting coffee seedlings without soil.)
Rev. Dep. nac. Café (D.N.C.) Rio de J., 1945, 25: 55-7.

The method of transplanting seedling coffee plants without

oil is described. The stem is cut off at 0.2 m. above the collar: all the roots except the primary one are removed, and even the primary root must be cut back if too long to go without bending) into the basket in which the seedlings are carried. The plants must be kept moist during transport covering them with a layer of damp soil and wrapping them round with canvas. The holes in which they are to be planted must be prepared beforehand and filled with good soil; in the centre of each another hole is then made to receive the plant which must be so handled that the root is not bent. When the young plants begin to grow the ground must be kept clean of weeds, and wind-breaks should be provided by growing appropriate plants, preferably the geon pea, *Cajanus indicus*.

53. MENDES, C. T. 633.73-1.543.1
O sombreamento dos cafezais. (Shading coffee.)
Rev. Agric. São Paulo, 1945, 20: 229-60.

The author sets out the advantages and disadvantages of providing shade in coffee plantations. On the whole he commends that the castor-oil plant be grown as a shade plant, particularly in areas of maximum insolation and in areas subject to frosts.

54. DE CAMARGO, R. 633.73
Em busca do húmus. (In search of humus.)
Bol. Superintend. Serv. Café, São Paulo, 1945, 20: 518-21.

He divides the more extensive use, in coffee fields, of shade plants not only to supply protection from unfavourable weather but also that their foliage may provide a layer of humus for the coffee crop.

55. NETO, J. A., AND DIAS, V. 633.73-1.459
Os "cordões em contorno" no restauro dos cafezais. (Contoured ramparts for the renovation of coffee plantations.)
Rev. Agric. São Paulo, 1945, 20: 195-8.

Each of the ground in the São Paulo province is on steep slopes subject to erosion and one of the chief problems of coffee growing in that region is to prevent such erosion. The recommendation is to construct a series of mounds and benches on the slopes to arrest the rain-water and allow it to soak into the ground without carrying away the upper layers of the soil. The method of preparing these ramparts with a plough is described.

56. MELLO, P. S. 633.73
Restauração dos cafezais. VII. (The restoration of coffee fields. VII.)
Rev. Dep. nac. Café (D.N.C.) Rio de J., 1945, 25: 361-4.

He recommends green manuring but without ploughing in the over crop; it is maintained that decomposition of the vegetation is more efficient if the detritus is left to accumulate on the surface of the ground.

57. BERGAMIN, J. 633.73-2.76
A broca do café *Hypothenemus hampei* (Ferrari, 1867). (The coffee berry borer.)
Bol. Superintend. Serv. Café, São Paulo, 1945, 20: 542-51.

The development of the beetle from the prepupal to the adult stage is described. Tables and graphs summarize the author's observations on the appearance of the various stages in the life cycle, particularly with reference to the time of their initiation after the eggs are laid.

58. HENDRICKX, F. L. 633.73-2.76
Un nouveau dégât occasionné par *Dasus simplex* E. aux caféiers (*Coffea arabica* L.). (A new form of damage to coffee by *Dasus simplex*.)
Rec. Commun. I.N.E.A.C. 1, 1943, pp. 7-11, bibl. 12.

Attention is drawn to ringing the bark of coffee trees *Dasus simplex*

was found to damage the crop by cutting off healthy green fruits in considerable numbers. Of 32,253 damaged fruits collected on an experimental plot at the Mulungu Station (I.N.E.A.C.) between 17 March and 25 April, 1941, 23.24% showed injuries by *D. simplex*. The following cultural measure is recommended as a cheap and effective control of the pest: At the end of the dry season after pruning cultivate superficially to encourage the growth of such plants as *Galinsoga parviflora*, *Ageratum conyzoides*, *Cleome ciliata*, *Amaranthus viridis*, *Brassica* sp., which the insect prefers as food to the coffee tree. If an adventitious cover cannot be established sow lupins or crotalaria.

469. MERDIAN, C. B. 633.74
Produção e comércio mundial do cacau. (Production of and international trade in cacao.)
Bol. Minist. Agric., Rio de J., 1943, 32: 9: 45-76.

The cultivation of cacao (*Theobroma cacao* L.) is an important factor in the national economy of the various Latin-American States. The production has increased considerably since the beginning of the present century not only in Latin America but more particularly in tropical regions along the west coast of Africa. Tables are given showing the yields obtained and amounts exported from various regions in South America, the Antilles and Mexico, and certain African States. The various regions are then discussed in turn with reference to their production and exportation of cacao. The most important countries importing cacao, the United States, Great Britain, Germany, Holland, and France, are briefly mentioned with regard to the quantities imported and the regions that supply them.

470. HOBLYN, T. N. 633.74: 519
The design of field experiments with cocoa.
Rep. Cocoa Res. Conf. London, May-June 1945, 1945, pp. 164-8, bibl. 2.

The book of this conference in which many suggestions were made for future research is aptly rounded off by this paper on the design of cocoa experiments in the field. The author roughly divides field experiments into three classes, viz. (1) variety trials (including rootstocks), (2) nutritional trials and (3) cultural trials (including methods of cultivation, pruning, spraying, shading, etc.) and he considers how the cocoa worker could best apply modern methods to cocoa trials without undue complications. He notes that the statistical analysis of long-term experiments on perennial crops is usually much more complicated than on annual crops and considers that it is absolutely essential to maintain the closest possible co-operation between experimenter and trained statistician to get maximum information from the data evolved.

471. POSNETTE, A. F. 633.74: 581.192
Inter-specific pollination in *Theobroma*.
Trop. Agriculture, Trin., 1945, 22: 188-90, bibl. 5.

Some degree of compatibility was found in crosses *T. cacao* × *T. angustifolium*, *T. cacao* × *T. grandiflorum*, and *T. cacao* × *T. (Herrania) balaoense*. The significance of these results is discussed.

472. POSNETTE, A. F. 633.74: 581.162.3
Incompatibility in Amazon cacao.
Trop. Agriculture, Trin., 1945, 22: 184-7, bibl. 17.

A description is given of a new floral character and of the petioles of some types of cacao introduced to Trinidad from the Amazon and Ecuador. All cacao flowers of West African Amelonado, Trinitario and Criollo types inspected have stamen filaments usually unpigmented, very occasionally faintly tinged with purple. All the Ecuador type trees examined have pigmented filaments, the colour varying from pink to maroon, and this character is also present in some upper Amazon populations. Hand pollination has shown that many of the Amazon types are self-compatible; they differ from self-incompatible Trinitario types in being cross-compatible.

473. THOROLD, C. A. 633.74-1.543.1
Observations on a trial of trees as shade for cacao.
Trop. Agriculture, Trin., 1945, 22: 203-6.
- An experiment is described where 15 tree species were compared on an area of land where the Bocara Immortelle (*Erythrina glauca*) and to a lesser extent the Anauca Immortelle (*E. poeppigiana*) suffer from a disease associated with the fungus *Calostilbe striispora*, the primary object being to find one or more species which would be unaffected by the disease. *Peltophorum ferrugineum* is worth further trial as a shade tree substitute for Bocara Immortelle, when a moderately high canopy is required. Where a high shade canopy is desired *Schizolobium excelsum* and *Parkia roxburghii* appear to be suitable. Jiggerwood (*Boavaisia integerrima*) made satisfactory growth and could serve as a cacao shade tree on soil tending to be waterlogged. Descriptive notes are given of the 15 species tested.
474. ANON. 633.821
A produção e a venda da baunilha mexicana.
(The production and sale of vanilla.)
Bol. Minist. Agric. Rio de J., 1943, 32: 39-45.
- This article begins by discussing the distribution of the vanilla plant (*Vanilla planifolia* Andr.) from its original home in Mexico, and the climate of the regions where it thrives. There are two methods of growing it: (1) by maintaining the plants in the forests where they are found, adapting the method of cultivation to the circumstances, and (2) by utilizing fields previously used for other crops, e.g. a maize field; in this case cuttings are planted at the base of forest trees which serve as its support. The cuttings produce delicate roots in the soil near the surface but later these roots disappear and the plants attach themselves to their supports by means of aerial roots. The vanilla plant flowers about the third year and continues in production for from 4 to 8 years, being usually abandoned when 9 to 10 years old. Under natural conditions about 1% of the flowers produce pods, pollination being effected by bees. In Europe, however, artificial pollination is practised. About 50% of the fertilized flowers produce pods. The pods are collected shortly before they are mature. The preparation of the spice and its disposal on the market are mentioned and the increased cultivation in Mexico is discussed.
475. CAMINHA FILHO, A. 633.88
A ipecacuanha, *Evea ipecacuanha* (Brotero) Standley.
Bol. Minist. Agric. Rio de J., 1943, 32: 10: 33-52.
- The true ipecacuanha, *Evea ipecacuanha* (Brotero) Standley = *Uragoga ipecacuanha* Baill., grows mostly in the state of Mato Grosso, Brazil, its native home. Its value depends on the therapeutic properties of drugs (particularly emetine) obtained from the roots. The synonymy of its scientific names and a list of its many common names are given, and the etymology of the name ipecacuanha is discussed. The plant is propagated by root fragments, by seeds and by cuttings. When raised from seeds these are sown in nurseries, prepared in the woodland, at a distance between the seeds of about 10 cm. The seeds when taken from the berries have to be washed to get rid of mucilage and then dried slightly in the sun. When the seedlings reach a height of 8 to 10 cm. they are transplanted to their permanent site. The seeds may be sown directly in the plantation, but it is preferable to raise the plants in nurseries as this permits the choice of vigorous plants and avoids the losses normally sustained at germination.
476. DE POERCK, R. A. 575.17: 633.88.5 + 634.6 + 634.651
Note sur les formules chromosomiques de *Cinchona ledgeriana*, de *C. succirubra*, d'*Elaeis guineensis* et de *Carica papaya*. (Chromosome numbers in *Cinchona ledgeriana*, *C. succirubra*, *Elaeis guineensis* and *Carica papaya*.)
Rec. Commun. I.N.E.A.C. 1, 1943, pp. 3-6, bibl. 4.
- Cinchona ledgeriana*, *C. succirubra*: n=17; oil palm varieties: n=16; papaya: n=9.
477. LEFÈVRE, P. C. 632.75
Comportement de *Helopeltis orophila* Ghesq. sur plantes adventices et sur légumineuses. (The behaviour of *Helopeltis orophila* on adventitious and leguminous plants.)
Rec. Commun. I.N.E.A.C. 1, 1943, pp. 50-7, bibl. 4.
- A study of the biology of the pest *Helopeltis orophila* adventitious and leguminous plants under *Cinchona ledgeriana* suggests that, in order to avoid reinfestation, *Crotalaria agathiflora* and *Indigofera arrecta* covers should be turned under before the insecticidal treatment is carried out.
478. CAMARGO, F. 633.913
Uma nova planta brasileira productora de borracha. (A new Brazilian rubber plant.)
Bol. Minist. Agric. Rio de J., 1943, 32: 4: 45-55.
- The author discusses the possibility of the extended cultivation in Brazil of the "Murupita" (*Sapium* sp.) as a source of rubber to replace *Hevea*, which in recent years has suffered severely from a leaf disease caused by *Dothidella uli*.
479. SECRETARY OF AGRICULTURE, SÃO PAULO. 633.913
Produção da borracha de mangabeira. (The production of rubber from mangabeira.)
Bol. Minist. Agric. Rio de J., 1943, 32: 10: 85-97.
- The author examines the cause of the decline in the industry applied to the production of sheet rubber from mangabeira [*Hancornia speciosa* Gomez], a source of rubber in Brazil. The poor quality of the rubber offered on the market has resulted in low prices, and methods are suggested for improving the product.
480. RICHARDS, A. V. 634.1/8(548)
Seasonal distribution of fruits in Ceylon.
Trop. Agriculturist, 1945, 101: 18-21.
- The wide regional variation in soil and climate in Ceylon not only enables a wide diversity of fruits to be grown but also influences the season of fruiting and the quality of the fruit. There also exist varietal differences in season of fruiting depending on whether the variety is inherently early, mid-season, or late. Fruits produced at a high elevation generally tend to come into season later than those in the low country; this is specially true of the durian, rambutan, and mangosteen, which are in season at Peradeniya about July-August, but are a month or two earlier in the low country. A classification is given of the fruits grown in different climatic zones of the island, and the seasonal distribution of the more common fruits (except plantain and papaw which are available all the year round) is set out. A graph shows the seasonal range of production of Ceylon fruits.
481. COTT, J. E. 634.421
The ubiquitous guava.
Calif. Citrogr., 1945, 30: 408.
- The common or tropical guava, *Psidium guajava* attracted attention during the war on account of its high vitamin C content, which is four to ten times that of orange juice. It is a native of the American tropics and has spread widely throughout the tropics of the world. It is a weed-bush having run wild in many places, such as Hawaii, and in some places, such as pasture lands of Cuba, it is often regarded as a pest. The author discusses the possibility of cultivating the guava in California and concludes that it would seem that commercial guava production for manufacturing purposes is out of the question so far as California is concerned.
482. WILLS, J. M. 634.57
The Queensland nut.
Qd agric. J., 1945, 60: 342-51; 61: 8-16.
- The Queensland nut (*Macadamia ternifolia*) is indigenous to

the coastal rain forests of southern Queensland and northern New South Wales. Among its names are Australian nut, Queensland nut, bush nut, Bopple nut, and macadamia nut. Some types have very hard shells but trees have been found bearing nuts with shells thin enough to be cracked with an ordinary nutcracker, and the cultivation of this type is extending in Australia. This nut is highly nutritious and is one of the richest oil-yielding nuts known, producing about 6% oil of good quality. The tree, its foliage, flowers and fruit are described. The blooms are very attractive to bees. The nut kernel is creamy-white, rich in flavour and oils, and keeps well. Although the tree is found growing naturally where there is a good average rainfall, when grown under cultivation it is fairly drought resistant once firmly established, and readily grows in a very wide variety of soils, ranging from open eucalypt forest soil to fertile alluvial flats. Situations exposed to high, cold winds should be avoided, as shelter is necessary for the protection of young nuts. Trees may be expected to bear commercial crops for at least 50 years. Propagation at present is confined chiefly to the raising of seedlings, but grafting young seedlings with scions from trees possessing desirable characteristics is engaging attention. Advice is given as to raising seedlings, planting them out, cultivation, pruning and harvesting. Ten illustrations show the tree, its foliage, inflorescences, seedlings, and fruits, and there is a description and diagram of a grader for sizing the nuts. Various types of the Queensland nut are mentioned. The variety *integrifolia* is described and the distinguishing characters of the four main commercial types are set out in a table.

483. SCHULTZ, E. F. 634.57
La Macadamia ternifolia F. Muell. O nogal de Queensland. (Macadamia or Queensland nut.)
Circ. Estac. exp. agric. Tucuman 32, 1945, 3 pp.
 This is a description of the Queensland nut, its distribution, its value as a plantation crop and its cultivation. It is grown now, not only in subtropical regions of Australia, America, S. Africa, the Caucasus and in the south of Europe, but also in tropical countries as Cuba, Puerto Rico, Brazil and particularly the Hawaii Islands; it has been introduced into Argentina by the agricultural experimentation station of Tucuman. It will stand a wide range of temperatures; at the Tucuman station it has resisted temperatures of 6-8° C. below zero over a period of 25 years. It forms a handsome tree and its flowers have an agreeable fragrance; it is unsuitable for avenues as it produces long branches low in the stem. Its nuts are of excellent quality, not only for domestic use but also commercially. Only a few nuts ripen in the tree; they mostly fall before they are fully ripe and are collected from the ground. Propagation is from seed not the young plants may be budded (on plants of the same species) from selected trees; one advantage of using rootstocks is that grafted plants come into bearing several years before those grown direct from seed.

484. TIMSON, S. D. 634.58
 The ground nut. Suggestions for ensuring profitable yields.
Rhod. agric. J., 1945, 42: 427-31.
 Experiments on the Salisbury Agricultural Experimentation station covering three seasons were laid down to find to what extent the crop preceding groundnuts might influence the yield of the latter crop. Increases following sunflowers, oats and sunnhemp (seed) were statistically significant. Groundnuts thrive well on virgin soils, providing ploughing has been done early, and they yield well following a crop which has received a good dressing of compost or kraal manure. A well drained sandy soil is particularly suitable in good heart, but excellent yields have also been recorded in red loams that are in good physical condition. In numerous trials the crop did not give economic responses to applications of phosphatic fertilizers, of potash, or of agricultural lime, but on very acid soils lime should be

beneficial. Where the crop is planted by machine it is important that the "seed" kernels should be even in size. Larger seeds from pods containing one kernel only gave no increase in yield compared with smaller seed from three and four seeded pods. The use of shelled seed is recommended, since this gives a better stand and more rapid germination than unshelled seed. The treatment of the seed with a mercurial dust is strongly recommended. Repeated trials have shown that a spacing of 18×6 in. gives higher yields than wider spacings, and recent trials indicated that a spacing even closer (12×6 in.) increases the yield. The seed should be planted at a depth of about 1½ to 2 in. The most commonly grown variety is the Spanish Bunch, which requires about 3½ to 4 months to mature. The other variety grown by European farmers is the Virginia Bunch, which has outyielded the Spanish Bunch in many trials, but it must be planted some three weeks earlier since it is slower in maturing. Notes on cultivation, ridging, harvesting, yields and marketing are given.

485. HOPKINS, J. C. F. 634.58-1.531.17
 The importance of seed disinfection of ground nuts.
Rhod. agric. J., 1945, 42: 432-3.

The three principal diseases of the groundnut are seed-rot, root-rot and rosette. Seed-rot and root-rot reduce the stand and render the crop more susceptible to rosette. The seed-rot, caused by various soil fungi, can be overcome by treating the seed with proprietary dusts at the rate of 5 oz. of dust to 1 bag (180 lb.) of shelled seed. Root-rot is caused by *Sclerotinia rolfsii* Sacc.; the infected roots turn brown but are usually covered with a white cottony growth, the mycelium of the fungus, and small, spherical, white or light brown sclerotia may be present; seed disinfection will help to control this disease also. Plants affected with rosette are yellow and stunted, the leaves distorted, the crown does not grow up, and the plant is flattened. Plants fail to form nuts after they become infected, so that those contracting the disease early in life may be completely barren. Rosette is a virus disease transmitted by aphids and these are favoured by hot, dry weather and a thin stand. A crop of closely planted nuts can resist drought better than plants more widely spaced and are less liable to infestation by aphids. A good stand should be ensured by carefully selected seed and the use of disinfectant dust.

486. MILLER, L. J. 634.58-2.754
 Peanut leafspot and leafhopper control.
Bull. Va agric. Exp. Stat. 338, 1942, pp. 24.
 Experiments on the control of leaf spot (*Cercospora* spp.) and leaf hopper (*Empoasca fabae*) in peanuts carried out on 70 farms in eastern Virginia over a period of 4 years, have shown that 3 or 4 applications of finely ground sulphur dust at 2-week intervals will, on the average, increase the yield of nuts by 481 lb. per acre. According to the type of variety grown, dusting should be begun between 5 July and 1 August. If a heavy infestation of leaf hoppers occurs before this, 15-20 lb. of pyrethrum-sulphur dust per acre should be applied, followed a week later by the first sulphur application of the schedule. Sulphur dusting has the further advantage that treated peanuts, which ripen 5-10 days later than untreated nuts, may be held in the ground for some time without serious loss.

487. MACEDO, A. 634.61
 Pelo aumento da produção do coqueiro no Paraíba. (Increasing the yield of the coconut palm in Parahyba.)
Bol. Minist. Agric. Rio de J., 1943, 32: 9: 27-44.
 Suggestions are made for raising the yields of the existing coconut groves in Parahyba, particularly with regard to manuring and the control of insect pests. The chief pests are described and some of them figured, and measures for controlling them are suggested.

488. CRAWFORD, D. M. 634.61
Coconuts in tropical America.
Agric. Amer., 1945, 5: 203-6, 215-6.
The distribution of the coconut palm is mentioned and the uses of its fruit are discussed, particularly with reference to the production of copra which has an oil content of about 66%. Mexico is the largest producer of copra and the British West Indies rank second.
489. SIDERIS, C. P., AND YOUNG, H. Y. 631.83: 634.774: 581.192
Effects of potassium on chlorophyll, acidity, ascorbic acid, and carbohydrates of *Ananas comosus* (L.) Merr.
Plant Physiol., 1945, 20: 649-70, bibl. 48.
The amounts of chlorophyll and carotenoid pigments in pineapple leaves were not affected by the amounts of potassium in the cultures. Titrable acidity values reported as citric acid were greater, except in a few cases, in the high- than in the low-potassium cultures. Ascorbic acid values were greater in the low-potassium cultures of the nitrate-nitrogen series but smaller in the corresponding cultures of the ammonium-nitrogen series. Total sugar values were greater in the low- than in the high-potassium cultures. Sucrose as percentage of total sugars was greater in the high- than low-potassium cultures and was more abundant in the chlorophyllose than non-chlorophyllose tissues of the leaves. Starch values were greater in the high- than in the low-potassium cultures. Starch depositions were greatest in the transitional and low chlorophyllose sections of the leaves and medial stem sections. Hemicelluloses and celluloses plus lignin were slightly higher in the low- than in the high-potassium cultures. The data emphasize that adequate amounts of potassium in the nutrient solution and consequently in plant tissues are essential for the condensation of reducing sugars to sucrose and starch. [From authors' summary.]—Honolulu, Hawaii.
490. SIDERIS, C. P., AND YOUNG, H. Y. 634.774-1.83
Effects of different amounts of potassium on growth and ash constituents of *Ananas comosus* (L.) Merr.
Plant Physiol., 1945, 20: 609-30, bibl. 50.
The effects were studied of high versus low potassium on the growth and ash constituents of *Ananas comosus* (L.) Merr. in solution cultures supplied with equal amounts of nitrogen from nitrate or ammonium salts. The plants of the high-potassium cultures in the nitrate series weighed 40%, and in the ammonium series 73% more than those of the low-potassium cultures. Ash values and succulence were generally higher in the high- than in the low-potassium cultures. Potassium was from 2 to 7 times higher in the tissues of the high- than of the low-potassium plants. The calcium and magnesium content of tissues was many times higher in the low- than in the high-potassium plants, but the calcium content was appreciably lower in the plants supplied with ammonium- than with nitrate-nitrogen. Phosphorus and iron were more abundant in the high- than in the low-potassium plants, and greater in the ammonium series than in the nitrate series. [From authors' summary.]—Honolulu, Hawaii.
491. PIERIS, H. A. 635.262
The cultivation of garlic (*Allium sativum* L.) in Udukinda Division—Uva Province.
Trop. Agriculturist, 1944, 100: 248-51.
The cultivation of garlic in Ceylon is not on a large scale and the author discusses the possibility of extending it. It is possible to make the Island self-sufficient in this commodity, if 1,000 acres more are brought under this crop. It prefers a high elevation from 3,000 to 4,000 feet such as in Palugama area in Udukinda Division of Uva Province, but it may also be grown in the drier regions of Ceylon at high elevations under irrigation. It can be cultivated in a wide range of soils, but prefers a medium loam. A good fertile tilth should be obtained by working the soil to a depth of about 8 inches. Notes on harvesting, curing, and storage are given, and there is a description of a garlic cultivation scheme, started with a view to encouraging the extension of this crop in the villages. Two trial plots were laid down; on one the results were not encouraging owing to the unsuitability of the soil, but the other demonstrated the possibilities of this crop as an economic undertaking.
492. ACHAYA, K. T. 638.22
The possibilities of sericulture in Ceylon.
Trop. Agriculturist, 1944, 100: 231-5.
One of the main requirements for successfully establishing a silk industry in any country is an abundant supply of leaves of the white mulberry, *Morus alba*. Many white mulberry trees are to be found in Ceylon that have grown to a good size, though no manuring and cultural operations have been done to accelerate their growth. The author considers therefore that the mulberry can be successfully grown in Ceylon and he gives notes on its propagation. It is suggested that three experimental stations should be started for demonstrating the possibilities of growing mulberries and successfully rearing silkworms in the three different areas of the Island, dry, wet up-country and wet low-country.
493. a HENDRICKX, F. L. 632.42
Sur les fructifications conidiennes de *Glomerella cingulata* (Stonem.) Spauld. et V. Schr. (*Sphaeria-citrea*). (Conidial fructifications of *Glomerella cingulata*).
Rec. Commun. I.N.E.A.C. 1, 1943, pp. 12-5, bibl. 3.
b MARSHALL, P. B., AND ROGERS, E. W. 633.88.51: 581.192
A colorimetric method for the determination of *Cinchona* alkaloids.
Biochem. J., 1945, 39: 258-60, bibl. 4.
494. VAN HIELE, T. 664.85.035.1
Het bewaren van fruit in gasdichte ruimten.
(The storage of fruit in gastight chambers.)
Meded. Tuinbouwvoorlichtingdienst 22, 1940, 42 pp.
It is stated that from the technical point of view there seems to be no difficulty in storing fruit in gastight containers. An improvement which could be introduced on existing types is an alteration of the entrance which is relatively small, particularly for loading the last chamber, the upper edge of the opening not being on a level with the roof of the container. Bramley's Seedling apple grown in Holland, as with this variety grown in England, is very suitable for storage in an atmosphere containing CO₂, and the same can be said of Cox's Orange Pippin, but not yet of Belle de Boskoop in which, although the results of storage in 2-5% CO₂ were better than in air, the difference was small. Oil paper appears to be necessary for Bramley's Seedling; the paper must contain 15% of its weight of oil. Large fruit do not store well; they are the first to show breakdown. Experiments with two varieties of sweet cherries in atmosphere containing 5%, 10%, and 15% CO₂ gave good results after 16 days' storage.
495. KIDD, F., AND WEST, C. 644.85.11
Quality in Cox's Orange Pippin apples.
Agriculture, Lond., 1945, 52: 419-22.
The effect of type of storage on quality in Cox's Orange Pippin was studied in an experiment during the seasons 1938-39, when a panel of 6 tasters—3 of them proved by experience to have unusually sensitive palates and to be

ry consistent in their verdicts—compared apples of different origins kept in ordinary storage (fluctuating temperature, averaging 52° F., and constant temperature 54° F.), in cold storage (39° F. constant) and refrigerated storage (3% O₂+10% CO₂+87% N₂ at 39° F.). The lots classed as excellent possessed a strong characteristic x's Orange flavour, irrespective of the storage method used. Broadly speaking, the better quality fruit showed little or no difference in relation to type of storage, while the poorer quality fruit in certain instances storage in air or ordinary temperature proved slightly superior to cold storage and gas storage. The trial also revealed an unexpected and striking parallel between eating and keeping quality. The tabulated results present some additional information, which has been summarized by the authors as follows: "In a general way it may be said that good eating and good keeping quality were associated with (1) a heavy soil, (2) a heavy dressing of potash, (3) a high total nitrogen and a high protein nitrogen content of the fruit, (4) a high protein nitrogen content in relation to total nitrogen content, and (5) a low average respiratory activity." The work formed part of the research programme of the Food Investigation Board and was carried out at the Ditton Laboratory, East Malling.

5. KIDD, F., AND WEST, C. 664.85.11
Respiratory activity and duration of life of apples gathered at different stages of development and subsequently maintained at a constant temperature. *Plant Physiol.*, 1945, 20: 467-504, bibl. 29.
The respiratory activity at normal temperatures of Bramley's seedling apples gathered at various stages of growth has been examined and recorded. There is a marked fall in respiratory activity per unit fresh weight during the early stages of the development on the tree—the period of cell division. The fall continues, but much more slowly, during the main growth period—the period of cell enlargement. The respiratory activity per unit nitrogen, and probably also per unit protein, remains approximately constant during the period of growth by cell enlargement. During the later stages of growth by cell division the respiratory activity per unit nitrogen is somewhat higher. It is suggested that respiratory activity on the tree is not limited by the active amount of enzyme present but remains constant as a result of an anti-regulation of substrate concentration, through a linkage between respiratory activity, formation of new cytoplasm, uptake of water, and increasing size of cell. During both growth periods the respiratory activity, per gathering, per fresh weight and also per unit nitrogen, falls. The drift in respiratory activity per unit fresh weight per gathering shows in general four main phases. These have been discussed in relation to their causation. Particular attention has been devoted to the third or climacteric phase, and to the effect of temperature, oxygen supply, and ethylene upon its onset. The climacteric rise in respiratory activity has been shown to occur in fruit on the tree as well as in fruit gathered at any stage of maturity. Evidence is adduced and discussed which indicates that the climacteric occurs as a result of the production of ethylene by the fruit itself in an auto-stimulation produced by this gas when present in the tissues in amounts above critical threshold values. [Authors' summary.]—Low Temperature Research Station, Cambridge, England.

7. SOUTHWICK, F. W. 664.85.11
The removal of organic emanations from the atmosphere surrounding stored apples. *J. agric. Res.*, 1945, 71: 297-314, bibl. 26.
Activated charcoal was distinctly superior to all the oils tested in its ability to remove vapors of ethyl acetate and organic apple emanations which react with concentrated furoic acid. The oils, activated charcoal, alkaline potassium permanganate, and activated sulfuric acid were unable to remove the ethylene from post-climacteric apple vapors.

At least sufficient quantities of ethylene remained in the air stream after passing through these materials to hasten the appearance of the respiratory and volatile climacteric of immature apples. Activated charcoal impregnated with bromine was sufficiently reactive at room temperatures to remove ethylene from the vapors arising from ripe apples. The rate of respiration and volatile production of pre-climacteric apples was not stimulated by the ethylene in ripe apple vapors after the vapors had passed through the brominated, activated charcoal. [Author's summary.]—Cornell, Ithaca.

498. SOUTHWICK, F. W. 664.85.11
Measurements of the volatile production of apples. *J. agric. Res.*, 1945, 71: 279-95, bibl. 31.

McIntosh apples stored at 32° F. were found to evolve about half as much volatile material as similar apples held at 40°. When the fruits were removed from storage and placed at 74°, they emitted more organic vapors in one day than they had during 5 months in storage. Apples which had previously been held at 40° continued to evolve more volatile material than fruits which were formerly held at 32°. Apples stored in an atmosphere of 5% carbon dioxide and 2% oxygen at 40° F. respired and produced volatiles at a slower rate, when removed to room temperature, than similar fruit previously stored at 32° in air. The quantity of volatile material arising from McIntosh apples harvested in 1941 and held at 74° F. was found to be much higher than that from similar fruit harvested in 1942. As the severity of scald was much more pronounced in 1941-42 than in 1942-43, it has been suggested that differences in apple emanations from one year to the next may be correlated with the amount of apple scald that will occur during the storage season for any given stage of maturity and set of storage conditions. Apples which are in the preclimacteric stage may be stimulated by an active agent (ethylene) so that the rate of volatile production as well as respiration is increased. [Author's summary.]—Cornell, Ithaca.

499. HANSEN, E. 664.85.11: 581.192
Quantitative study of ethylene production in apple varieties. *Plant Physiol.*, 1945, 20: 631-5, bibl. 6.

Early-maturing summer apples produced more ethylene during ripening than late-maturing fall varieties. The maximum rates of ethylene production at 20° C., expressed as ml. per kgm./24 hrs., were as follows: Astrachan, 11.38; Red June, 9.27; Gravenstein, 5.16; Delicious, 1.77; and Newtown, 1.78 ml. With the exception of Astrachan, the amounts of ethylene produced by mature but unripened fruit were below the sensitivity of the analytical method used (0.001 ml.). The rates of ethylene production increased rapidly after picking in the summer-maturing apples but slowly in Delicious and Newtown. Apples stored at 0° C. produced ethylene at approximately one-eighth to one-eleventh the rate at 20° C. The rates of production at 0° C. for Delicious, Newtown, and Jonathan were 0.211, 0.071, and 0.185 ml. per kgm./24 hrs., respectively. The data obtained indicate that the intensity of ethylene production increases during the storage period. Early-maturing varieties of apples showed a distinct climacteric rise in respiration, but this was not apparent in either the Delicious or Newtown apples. The increase in ethylene production during ripening does not appear to be correlated with total CO₂ production. [From author's summary.]—Corvallis, Ore.

500. SOUTHWICK, F. W. 632.944: 664.85.11
The influence of methyl bromide on the rate of respiration and softening of apples. *Proc. Amer. Soc. hort. Sci. for 1945*, 1945, 46: 152-8, bibl. 6.

The effect of methyl bromide on apples appears to be to stimulate respiration in the early preclimacteric phase and hence to shorten storage life. They are otherwise uninjured.

It may therefore be advisable to delay the time of fumigation with methyl bromide until such time as the climacteric rise of stored apples has—with reasonable certainty—begun.—Storrs, Connecticut.

501. PIENAZEK, S. A., AND CHRISTOPHER, E. P. 664.85.11

The relation of the time factor to the influence of concentration of wax emulsion on the reduction of the rate of transpiration of apples.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 119-22, bibl. 3.

Observations on the effectiveness of different concentrations of wax emulsion show that the reduction of the rate of transpiration of treated apples is not constant throughout the storage for any one concentration.

502. PIENAZEK, S. A., AND CHRISTOPHER, E. P. 664.85.11

Effect of pre-storage treatments on the incidence of scald of Rhode Island Greening apples.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 123-30, bibl. 11.

Prestorage treatment of apples with atmospheres of 30 and 60% CO₂ at storage temperatures (approx. 32° F.) for 3, 6 and 10 days gave very good scald control without any resultant off-flavour, while ripening was delayed. Other devices for preventing scald were unsuccessful or resulted in off-flavours.—Kingston, R.I.

503. PIENAZEK, S. A. 664.85.11: 632.19
Pre-storage carbon dioxide treatments for control of apple scald.

Plant Physiol., 1945, 20: 313-4, bibl. 4.

A brief description of tests at Rhode Island Experiment Station in which Rhode Island Greening apples picked at different dates were submitted to air containing 30% and 60% CO₂ for 3, 6 and 10 days and then restored. Results on scald control were extremely promising.

504. CHING-CHAO, W. (WEI, C. T.), AND KWOH-HSIEN, H. 664.85.31: 632.4

A preliminary report on the control of storage rots of sweet oranges.

Pap. Dep. appl. Biol. Nanking Univ. 55, undated, pp. 24, bibl. 24.

Storage rots in sweet oranges caused by *Penicillium italicum* and *Phomopsis citri*, were best controlled by treating the fruits for 5 minutes with a 5% crude borax solution or a 5% 2:1 borax-boric acid solution at 110° F.

505. HALLER, M. H., AND OTHERS. 664.85.3

Respiration of citrus fruits after harvest.

J. agric. Res., 1945, 71: 327-59, bibl. 20.

The carbon dioxide evolved and the oxygen consumed by oranges, grapefruit, and lemons were determined under different experimental conditions. The respiratory rates of all the fruits increased greatly with increased temperature. The temperature coefficients (Q₁₀) were highest between 32° and 50° F.; dropped to minima, averaging about 1.5 between 62° and 90°; and increased again above these temperatures, particularly in carbon dioxide output. At the lower temperatures (32°, 40°, and 50° F.), the respiratory rates remained fairly constant with time, whereas at the higher temperatures (70° to 110°) the rates generally decreased with time. The respiratory ratios, volume of CO₂: volume of O₂, did not differ significantly at the low and intermediate temperatures (32° to 80°) but increased markedly at the higher temperatures (90° to 110°), indicating intramolecular respiration. The results indicate that the respiratory activity of oranges and lemons decreases with increased maturity. The respiratory activity of oranges from trees on sour orange rootstocks was higher than that of oranges from trees on rough lemon rootstocks. The heat of respiration of the different fruits was computed for the

different temperatures. The heat of respiration averaged 11% to 96% higher when computed from carbon dioxide determinations than when computed from oxygen determinations. It is pointed out that oxygen determination represent the sounder basis for computing the heat of respiration, particularly at high temperatures. The addition of ethylene at the rates of 1 to 10 parts by volume to 10,000 parts of air, greatly increased the respiratory activity of oranges, grapefruit, and lemons. The increase was 1 much with 1 as with 10 parts of ethylene per 10,000; much weaker concentrations (1 part to 100,000 and 1 part to 1,000,000) had no apparent effect. Daily additions of ethylene at the rate of 2 parts per 10,000 did not increase maintain the respiratory activity more than the initial addition of 2 parts per 10,000. The maximum respiratory activity was generally attained 2 to 3 days after the addition of ethylene; the activity then decreased; and respiration returned to normal after aeration. The respiratory activity of lemons infected with green mold (*Penicillium digitatum*) was increased to as much as 12 times that of sound lemons. The results indicated that respiratory activity occurs both the flesh and rind of lemons approximately in proportion to their fresh weights. The respiratory activity of grapefruit from trees sprayed with lead arsenate was lower than that of grapefruit from trees not so sprayed. [Authors' summary].—Bureau of Plant Industry, Wash., D.C.

506. HALL, E. G. 664.84
Notes on the storage of vegetables for processing.

Food Pres. Quart., 1945, 5: 19-25, bibl. 10.

These notes were prepared because it is sometimes necessary to store vegetables for various periods before consumption or until they can be handled by processing plants. Important points are: careful handling, cool storage, the avoidance of shrivelling, the importance of ventilation, stacking bags, handling from cool storage, and frequent inspection. The requirements for successful storage are outlined: potatoes, carrots and parsnips, cabbages, onions, silver beet, sweet turnips, peas and green beans, sweet corn and tomatoes.

507. KESSLER, H. 664.84

Die Gemüselagerung im Lichte der Lagerungsversuche des Winters 1943/44. (Vegetable storage in the light of trials in the winter of 1943/44.)

ForschErgebn. Geb. Gartenb., 1944, H.6, pp. 22-47, bibl. 6.

As the advantage of fruit and vegetable storage in air-cooled cellars becomes apparent, more such buildings of various construction are put up in Switzerland. The present report covers trials with cabbage, red cabbage and savoy 7 cellars. Temperature graphs and tabulated data presented in detail and principles of construction discussed. On the whole, the results show an improvement on those obtained in the previous year.

508. KESSLER, H. 664.84

Die Lagerung in luftgekühlten Erdkellern im Winter 1942/43. (Vegetable storage in air-cooled cellars in winter 1942/43.)

ForschErgebn. Geb. Gartenb., 1944, H.5, pp. 51-64.

Work on the author's air-cooled cellar has been repeatedly noted in *H.A.*, see especially *H.A.*, 12: 1531; 14: 937 and 15: 1997. In the winter of 1942/43 several varieties of cabbage and red cabbage were stored in 3 air-cooled cellars located in different parts of Switzerland and in cold storage at 0° C. Total losses of 3 groups of cabbages and cabbages kept for 113-129 days in the air-cooled cellars Wädenswil and in cold storage amounted to 29.7, 31.9, 29.1% and 30.1, 20.9 and 15.9% respectively. In view of the extraordinarily difficult temperature conditions of season the results are regarded as promising. Artificial ventilation by fans proved a disadvantage. The temperature graphs of the 3 cellars are reproduced in conjunction with the outside temperature graphs at the 3 localities.

09. VAN HIELE, T. 664.84.25.037
Het bewaren van uien in een fruitbewaarplaats.
(The storage of onions in a fruit store.)
VAN STUIVENBERG, J. H. M.
Het bewaren en het koelen van uien. (The
storage and cooling of onions.)
MATHOT, H. J.
Het ascorbinezuurgehalte van bewaaruien. (The
ascorbic acid content of stored onions.)
Meded. Inst. Onderz. Verw. Fruit Groenten,
Wageningen, 1943, rks. 1, No. 9, 56 pp.
A symposium entitled "Verzamelde rapporten van proeven
inzake het bewaren en het koelen van uien 1940-1942"
a combined report concerning the storage and cooling of
onions).
For the storage of onions experiments were made with an
American system of ventilating in a fruit depository which
could be cooled by the admission of cold night air; the
experiments took place during two winters, one mild,
when the various methods showed little or no differences,
and the other severe. For long storage a temperature of
-1° C. is recommended; at the beginning of storage
higher temperatures, e.g. +1° C., can be allowed. Both
variety and growing conditions influence the choice of
temperature. Transport from the uncooled to the cooled
storage room should be finished before 1 March, otherwise
the sprouting cannot be sufficiently checked. There are
indications of a correlation between the amount of dry
matter and the keeping qualities of the onions at low
temperatures. One strain (U.W.1, a selection from a
Polish variety Wolska) has shown outstanding keeping
qualities. Immediately after harvest the ascorbic acid
content of the onion decreases suddenly; afterwards,
during storage, it increases again. Both phenomena are
closely related to variety and to storage conditions.
10. KESSLER, H., AND FEY, M. 664.84.64.037
Kühlagerungsversuch mit verschiedenen toma-
tensorten im Sommer 1942. (Cool storage trials
with tomato varieties in the summer of 1942.)
ForschErgebn. Geb. Gartenb., 1944, H.5, pp.
46-50.
Preliminary trials with 5 tomato varieties indicate that at a
temperature of 1° C. and a relative humidity of 85-90%
fruits picked in August three-quarters ripe may be stored
for approximately 4 weeks. The encouraging results
appear to warrant further investigation.—Wädenswil
Research Station.
511. KESSLER, H., AND SCHÜTZ, F. 664.84
Vergleichende Lagerungsversuche mit verschie-
denen Gemüsearten. (Comparative storage trials
with different kinds of cabbage.)
ForschErgebn. Geb. Gartenb., 1942, H.2, pp. 9-14.
A concrete cellar, three-quarters under ground, and a clamp
proved equally good for storing different kinds of cabbage.
The trials were carried out at Wädenswil during the winter
of 1940/41.
512. RICHARDS, M. C., YEAGER, A. F., AND JONES,
R. C. 664.84.62
Changes in the skin of the Blue Hubbard squash
during storage and its relation to spoilage of the
squash fruits in storage.
Abstr. in Phytopathology, 1945, 35: 656.
Disease losses in storage on Blue Hubbard squash were
materially reduced when the fruits were dried by using heat
for the first two weeks of the storage period. Drying of
the skin decreased the number of infections through minor cuts
and bruises made during the harvesting operations. No
noticeable morphological changes took place in the cells of
the skin during the 14-day curing period. After four
months' storage, both the thick and the thin-skinned types
spoiled from numerous infections by *Alternaria*, *Fusarium*,
and *Borytis* when the fruits were placed under conditions
favourable for infection in a cold storage room at 35-40° F.
A dry room at 50-60° F., following the two weeks curing
period, was most satisfactory for storage. Removing both
mature and immature fruits, before frost, directly from the
field to the storage and removing the stems materially
reduced losses from black rot.
513. VAN STUIVENBERG, J. H. M. 664.84.21
De beïnvloeding van de consumptie-waarde door
toepassing van verschillende bewaarmethodes
tijdens den winteropslag van eenige aardappel-
rassen. (The influence on consumption value of
various storing methods during the winter storage
of different potato varieties.)
Reprinted from a symposium *Samenstelling en
voedingswaarde van aardappelen en aardappel-
producten*, Utrecht, 1943, 12 pp., bibl. 13.
This article reviews observations by previous investigators
on the physiology of potato tubers during storage and
describes work carried out by the author. Descriptions and
illustrations show the reaction, with regard to sprouting,
of certain varieties to various treatments, e.g. temperature
and growth substances. In particular the retarding action
is shown of naphthaleneacetic acid methyl-ester when
applied as a spray or in powder form with talc as a carrier.

PROCESSING AND PLANT PRODUCTS.

514. FIGULEBSKIĬ, G. 577.16: 634/635
Results of the third All-Union conference on
vitamins (Dec. 1944). [Russian.]
Sovetsk. Botan., 1945, 13: 2: 67-8.
Numerous aspects of plant vitamins were discussed at the
conference. Plants of the following genera were considered
to be especially rich in vitamin C: *Gladiolus* (40 spp.),
Rosa spp., *Juglans* spp., and *Primula* spp. Other plants to
be studied were lucerne, the conifers, *Allium giganteum*,
Eleutherus angrenicus and *Heracleum lehmannianum*, which
may prove valuable not only on account of its vitamin C
but also of an etheral oil containing anethol. The quanti-
ties of vitamin C in the plants named are given in this
report. Methods of extracting vitamin C and carotin are
also discussed. The following sources of vitamin C have
been utilized: conifer needles; green walnuts, from which
the vitamin was obtained in crystalline form; mountain ash
berries, from which also carotin was extracted; and *Phrag-
mites communis*. The content of vitamin C in plants and its
variation according to the time of day or night, season and
ecological conditions, the physiological processes of vitamin
C formation in relation to respiration, and the occurrence
of the vitamin in plants occupying various positions in
the botanical classification were all subjects of discussion
at the conference.
515. ČAILAHJAN, M. 635.937.34: 577.16
The correlation between the amount of vitamin C
in the fruit of *Rosa* spp. and the form of the calyx.
[Russian.]
Sovetsk. Botan., 1945, 13: 2: 60-2.
The fruits of some *Rosa* spp. growing in Armenia contain
more vitamin C than others; the former can be distinguished
by means of the calyx retained by the mature fruit. The
calyx on the fruit of the species richer in the vitamin is
erect, fleshy, and remains attached to the fruit longer than
does the calyx on the fruit of the other species, in which
the calyx curves downwards and soon dries up. It is
suggested that vitamin C, exerting an influence similar to
that of auxine, maintains the calyx in a fresh condition and
attached to the fruit longer in the species rich in vitamin C
than in those containing little of it.

516. WOKES, F., AND OTHERS. 634.51: 577.16
Seasonal changes in true and apparent vitamin C
in walnuts.
Abstract in *Biochem. J.*, 1945, 39: xxv.
The seasonal changes in true and apparent vitamin C in
walnuts are recorded for different tissues. The correlation
found between the two values in all cases confirms the
hypothesis that apparent vitamin C is a precursor of true
vitamin C in the walnut.
517. SCARBOROUGH, H. 577.16
Observations on the nature of vitamin P and the
vitamin P potency of certain foodstuffs.
Biochem. J., 1945, 39: 271-8, bibl. 41.
The preparation from orange meal, and the characterization,
of hesperidin and hesperetin are described, but, for reasons
given, neither can be regarded as vitamin P. The grape
has proved to be the richest natural source. Vitamin P
potency does not parallel ascorbic acid content. Vitamin P
potency as assessed by capillary resistance determinations
in man is destroyed by boiling the active solutions in air
or by shaking with charcoal. A slow but gradual loss of
vitamin P potency was observed during storage of a prepara-
tion of black currants stored at 20° in the dark in the absence
of oxygen. Loss of vitamin P activity is to be expected from
fruit preparations (e.g. rose-hip syrup) under ordinary
conditions of storage. [From author's summary.]—The
Royal Infirmary, Edinburgh.
518. MATHOT, H. J. 577.16: 634/635
Verslag van het onderzoek naar kwaliteit bepa-
lende componenten in fruit en groenten. (Report
on the investigation of the constituents determining
quality in fruit and vegetables.)
Versl. Inst. Onderz. Verwerk. Fruit Groenten,
Wageningen, 1942, 1943, pp. 26-41.
This paper describes the results of investigations on vitamin C
in French beans and various herbaceous plants, the
oxalic acid content of goosefoot (*Chenopodium album*), and
of rhubarb flowers, quality in red and in white currants,
the food value of turnip leaves, and the preservation of
French beans.
519. MURRAY, W. G., POLLARI, V. E., AND BAKER,
G. L. 664.85.047: 577.16
Stability of ascorbic acid in powdered mixes and
in low-solid gels.
Fruit Prod. J., 1945, 25: 36-7.
It is concluded that properly packaged gel powders may
serve as carriers for vitamin C. Practically no losses in
l-ascorbic acid values of gel powders occur at temperatures
of 40° C. or below. Low-solid gels, however, soon lose
a large portion of their ascorbic acid. [From authors'
summary.]
520. POLLARI, V. E., MURRAY, W. G., AND BAKER,
G. L. 664.85.047
Powdered gel or dessert bases.
Fruit Prod. J., 1945, 25: 6-8.
"Dehydrated gel desserts" facilitate handling in trans-
portation and in storage, and the primary object of this
research was to produce a gel or dessert mixture in the
powdered state ready for the simple addition of water,
followed by heating to aid solution and cooling for gelation.
A secondary idea is that these powders can act as carriers
of vitamins. The authors conclude that basic recipes can
be developed from low-methoxyl pectin for making attractive
dessert gel powders to which l-ascorbic acid, dehydrated
fruit powders, or synthetic flavouring and colouring materi-
als can be added. These powders will make low-solids
gels with a saving of both shipping space and weight.
521. CULPEPPER, C. W., AND CALDWELL, J. S. 635.653
The development of different parts of the lima
bean pod in relation to tests for stage of develop-
ment and eating quality of its seeds.
Fruit Prod. J., 1945, 24: 331-6, 347, 368-72, 377,
379, 381, bibl. 25.
Among the factors or characters formerly proposed for
study in estimating the stage of development and period of
optimum quality in lima bean are: age of the seed from
date of blooming, specific gravity of the seed, and specific
gravity of the cotyledons after removal of the seed coat.
The author proposes others: the fresh weights of the entire
pod and of pericarp, entire seed, seed coat, and cotyledon;
the ratios between fresh weights of seed and pericarp and
between cotyledons and seed coat; the dry weights of the
entire pod, seed cotyledons, and seed coats; the ratio
between these dry weights; the ratio of the dry weight of the
developing seed to that of the mature dry seed of the variety;
the total solid contents of the entire pod, and of each of its
components. The results are given in tables and shown
graphically.
522. VANDENBELT, J. M. 634.61: 613.2
Nutritive value of coconut.
Nature, 1945, 156: 174-5, bibl. 1.
The vitamin content of coconut milk was determined as
follows, in micrograms/c.cm.: Nicotinic acid, 0.64;
pantothenic acid, 0.52; biotin, 0.02; riboflavin, <0.01;
"folic acid", 0.003.
523. LÜTHI, H. 663.25
Aus einem alten Buch vom Wein. (Extracts
from an old book on wine.)
Schweiz. Z. Obst- u. Weinb., 1945, 54: 461-3.
Interesting quotations are taken from a Latin treatise on
wine by the French Doctor Arnoldus de Villa nova printed
in a German translation early in the 16th century.
524. LÜTHI, H. 663.25
Gefährlicher Säurerückgang bei 1945-er Weinen.
(Alarming acid losses in 1945 wines.)
Schweiz. Z. Obst- u. Weinb., 1945, 54: 455-8.
The Swiss wines of the exceptional wine year 1945 are
mild that in many cases acid decomposition has taken place
at an alarming rate. Treatment with 8 g. and 10 g. potas-
sium metasilphite per 100 litres of red and white wine
respectively is recommended.
525. WOODROOF, J. G., AND CECIL, S. R. 664.84 + 664.85
Sulphur dioxide solution as a preservative for fruit
and vegetables.
Fruit Prod. J., 1945, 25: 15-8, 25, 47-52, 72-6,
89, bibl. 54.
Sulphur dioxide solution in concentration of 1,500-2,000
parts per million, is an effective preservative for fruit
pulp, and fruit juices. For sulphur dioxide preserva-
tion, the materials are cheap and the operation simple.
A few vegetables for use in soups, pickles, etc., may be
preserved with sulphur dioxide alone or in combination with
brine. A "firming agent" should be used with soft fruit
such as peaches or strawberries; the most widely used
firming agent is calcium carbonate, but calcium hydroxide
(hydrated lime) or other calcium compound may be used.
526. EIDT, C. C., AND MACARTHUR, M. 664.85.73.047
Dehydration of low-bush blueberries.
From reprint *Food in Canada*, December 1944,
pp. 3, bibl. 2.
Fundamental work on the dehydration of wild type lowbush
blueberries was undertaken at the Dominion Experimental
Station, Kentville, N.S., in 1939. Two different pre-treat-
ments were compared with no pre-treatment and it was
found that dipping berries for 3-5 seconds into 1% ly-

lution gave the best product. A temperature of 155°-160° F. throughout the drying period proved more satisfactory than a starting temperature of 170°-180° F., finishing at 150° F. Initial cleaning of the blueberries was not necessary. Further experiments, which are discussed in detail, were carried out in 1944 at the Fruit Products Laboratory, Division of Horticulture, where the model tunnel was used. An entirely satisfactory product was obtained by employing a pre-treatment in lye solutions ranging from 0.3% to 0.43% at 200° F. for 2 seconds and drying for 200 minutes to a moisture content of 14%. The drying ratio, i.e. the number of pounds of fresh fruit required to yield one pound of dry fruit, was 5.81. A reduction of the dipping period to 2 seconds proved necessary to avoid cracking and splitting of the skin. In practice, titration and adjustment of the caustic solution after each load of 400 lb. was adequate. It was further found that only firm blueberries are acceptable for dehydration. The removal of sticks and leaves from the finished product was later simplified by dehydrating to a moisture content of approximately 8%. After cleaning, the fruit was packed to the desired moisture of 14-15%. The results of tests on the preparation for table use of the dehydrated berries are discussed.

7. BAKER, G. L., POLLARI, V. E., AND MURRAY, W. G. 664.85.047

Cold-mix dehydrated fruit spreads.

Fruit Prod. J., 1945, 24: 356-60, bibl. 6.

The object of this project was to develop a powdered fruit especially composed of dehydrated fruit and other materials which might be moistened with water and would almost immediately, without the application of heat, assume the character of a fruit jam. From the experiments described was concluded that powdered cold-mix jams or spreads can be made from dehydrated fruits mixed with sugars, hydrocolloid thickening agents, salts, and acids, which, when the proper amount of water is added, will thicken rapidly to a desirable consistency.

8. WIEGAND, E. H., LITWILLER, E. M., AND HATCH, M. B. 664.85.047

Dehydration of cherries and small fruits.

Fruit Prod. J., 1945, 25: 9-14, 23.

The experiments described show that steam blanching, sulphuring or combinations of these are the best pretreatment methods. Sulphur dioxide aids in the retention of ascorbic acid in dehydrated strawberries. Sulphur dioxide not retained over long periods at room temperatures or 95° F. High temperatures greatly accelerate its loss. Sulphuring experiments indicate that satisfactory concentrations of sulphur dioxide can be rapidly built up in cherries, by heating the fruits, subjecting them to vacuum, releasing this with gas and holding for a few minutes.

9. SCOTT, W. J. 664.8.047: 632.3/4

Micro-organisms in dehydrated products.

Food Pres. Quart., 1945, 5: 9-10.

Dehydrated products contain living micro-organisms, often in large numbers. Their equilibrium humidities, however, are below that permitting growth of bacteria or fungi, and when packed in suitable containers the storage life is not limited by growth of micro-organisms. Nevertheless the microbial content of dried foods is not without significance. The product should contain neither organisms nor their toxins which are likely to be harmful to man, nor organisms in numbers sufficient to lead to rapid spoilage during reconstitution at ordinary temperatures. Some of the factors influencing the numbers and types of micro-organisms in the product are (1) the condition of the raw materials (they should be free from dangerous organisms or their toxins), (2) conditions of manufacture (exclusion of contamination), (3) storage conditions. Estimates of the microbial contents of foodstuffs should be made as soon as possible after manufacture, or, when delay is unavoidable, after storage at cool temperature.

530. TROUT, S. A., AND HALL, E. G.

664.85.21.047+664.85.25.047+664.85.13.047

Notes on the dehydration of apricots, peaches and pears.

Food Pres. Quart., 1945, 5: 15-8.

Sun drying and artificial drying or dehydration are compared, and blanching and sulphuring are discussed. Experiments have shown that blanching the cut fruit in live steam at a temperature of 200-212° F. before sulphuring will enable the production of a dehydrated article superior to sun-dried fruit in texture, reconstitution and palatability.

531. CALDWELL, J. S., CULPEPPER, C. W., AND HUTCHINS, M. C. 634/635: 664.84/85

Further comparative studies of varieties of certain fruits and vegetables for dehydration.

Proc. Amer. Soc. hort. Sci. for 1945, 1945, 46: 375-87, bibl. 11.

The material considered was:—highbush blueberries, freestone peaches, potatoes, garden beets, carrots, snap beans, pumpkins and winter squashes. The merits of varieties known in Maryland are discussed.

532. COOK, R. P., AND OTHERS. 635.656: 633.88

Factors in aqueous extracts of peas responsible for penicillin production.

Abstract in *Biochem. J.*, 1945, 39: xxiii.

Water extracts of freshly ground dried peas form a good medium for the production of penicillin.

533. BRYCE, W. A., AND TESSIER, H. 664.84/85.036

A simple method of sealing gas- or vacuum-packed tins.

Canad. J. Res., 1945, 23, Sec. F, pp. 304-5.

The need for a method of sealing gas- or vacuum-packed tins arose in connexion with studies conducted on the storage of dehydrated foods. A method of soldering tins in a gaseous atmosphere or in a vacuum is described. The heating element is a coil of resistance wire supported over a hole in a flat surface of the tin. When the heating circuit is closed, a small piece of solder previously hung in the upper end of the coil is melted and drops on the area about the hole and thereby produces an effective seal. The entire operation can be completed in half an hour. The method and an example of the seal obtained are illustrated.

534. MCKENZIE, H. A. 664.8.036.5

Tin in canned foods. Its occurrence and significance.

Food Pres. Quart., 1945, 5: 5-8, bibl. 27.

Since the large-scale use of tins for foods became widespread, attention has been focused upon the contamination of such foods with tin. The literature on tin in canned meat, vegetables and fruit is here reviewed. Tin adversely affects the colour of foods containing anthocyanin pigments, such as cherries, berries, beetroot and plums. On the other hand, this reducing or bleaching action is important in maintaining the colour in other products, such as pears, pineapples and grapefruit. The flavour of canned foods is sometimes affected by the tin present and this is particularly true of fruit juices. There is some evidence that acute tin poisoning may be caused by amounts of tin which, under unusual circumstances, may be present in canned foods. The English and Australian legal limit is 285 parts per million and the American figure (300 p.p.m.) is very similar. At the present time the balance of evidence shows that no harm results from the consumption of minute amounts of tin in canned foods.

535. SCOTT, W. J., AND STEWART, D. F. 664.84.036.5

The influence of dissolved tin on the growth of *Clostridium botulinum* in canned vegetables.

II. Further experiments in plain and lacquered cans.

J. Coun. sci. industr. Res. Aust., 1945, 18: 173-80, bibl. 6.

The conditions under which growth of the deadly bacterium

Clostridium botulinum is inhibited in canned beetroot and carrots have been described in a previous paper (*ibidem*, 1944, 17: 16-22; *H.A.*, 14: 1428). Further experiments were carried out with nine additional vegetables and showed that following inoculation with the bacterium growth occurred consistently in lacquered cans of all vegetables and in plain cans of asparagus, cabbage, cauliflower, peas, potatoes and white turnips. At 20°, 30° and 37° C. the bacteriostatic effect of dissolved tin in plant cans was found to prevent growth of *C. botulinum* for periods up to 6 months in the case of French beans, silver beet (Swiss chard) and parsnips.

536. SPIEGELBERG, C. H. 664.85.774
Sugar and salt tolerance of *Clostridium pasteurianum* and some related anaerobes.
Reprinted from *J. Bact.*, 1944, 48: 13-30, bibl. 53, being *Tech. Pap. Univ. Hawaii Pineapple Res. Inst.* 143.

The data are presented in relation to spoilage of canned pineapple.

537. ESSELEN, W. B., Jr. 664.84.036.5
Botulism and home canning.
Bull. Mass. agric. Exp. Stat. 426, 1945, pp. 28, bibl. 51.

Botulism is a deadly disease caused by toxins of the bacterium *Clostridium botulinum*, which may develop in home

canned foods if a faulty technique is used. A summary available information is presented. Most of the outbreaks in the U.S. have been due to canned vegetables.

538.
a CANADA DIVISION OF HORTICULTURE. 664.85.037 + 664.84.037
The preservation of fruits and vegetables by freezing.
Min. (unnumbered) Canada Dep. Agric., 1945 (?), pp. 5.
b COOK, R. P., AND BROWN, M. B. 635.656: 581.192
Some constituents of aqueous extracts of ground dried peas.
Abstract in *Biochem. J.*, 1945, 39: xiv.
c GÖSTA, J. 633.491: 577.16
Vitamin C metabolism in potatoes.
Ann. agric. Coll. Sweden, 1944-45, 12: 131-65, bibl. 53.
d MCKENZIE, H. A. 664.8.036.5
A volumetric method for the determination of tin in foods.
J. Coun. sci. industr. Res. Aust., 1945, 18: 181-7, bibl. 27.

NOTES ON BOOKS AND REPORTS.

539. CHRISTIANSEN, W. 587.36
Leguminosae, Lebensgeschichte der Blütenpflanzen Mitteleuropas. (Leguminosae. Part 61/62 of the life history of flowering plants of Central Europe.)
E. Ulmer, Stuttgart, 1942, pp. 173, subscription price RM. 11., from review *Angew. Bot.*, 1943, 25: 398.

Part 61/62 brings the *Leguminosae* to a conclusion, and deals especially with *Viciae* and *Phaseolae*. The treatment of the subject includes information on cultivation, habitat, existing strains, etc., and is supported by 82 illustrations. The last chapter gives a detailed account of the taxonomy, habitat, root, leaf, flowering, seed, fruit, distribution, germination, development in the early stages and cultivation of *Leguminosae*.

540. COMMISSION POMOLOGIQUE ROMANDE. 634.1/2 + 634.7(494)
Nouvelle pomologie romande illustrée. Partie I. (Pome and stone fruits.)

V. Attinger, Neuchâtel, 1944, 2nd edition, pp. 116, in paper cover Fr. 12.50, bound Fr. 14.50.
Partie II. *Arbres et arbustes à petits fruits. (Small fruits.)*

V. Attinger, Neuchâtel, 1945, pp. 111, in paper cover Fr. 10.40, bound 12.40.

The eye of the English reader may well linger on these beautiful reproductions of pome and stone fruits, though many may be unfamiliar to him. The first volume presents 49 coloured plates of the most important apple, pear, plum, quetsche, cherry, apricot and peach varieties grown or to be grown in the favourable climate of French Switzerland. It is not astonishing that some of the varieties recommended are not listed in Bunyard and that the respective authors do not show enthusiasm for the same varieties. A case in point is Cox's Orange, which with other leading English dessert apples is not mentioned here, and the Calville Blanc d'Hiver, which the Swiss authors describe as the queen of apples. In the case of tree fruit varieties the description is given under the following heads: synonyms (local and German); origin; description of the fruit; its use and keeping qualities; tree character; yield; pollination; resistance to certain climatic conditions and altitude; soil

requirements; susceptibility to pests and diseases; root stocks; faults.

The second volume, the scope of which has already been indicated in *H.A.*, 15: 1944, does not follow very closely the rigid treatment adopted for the first, but it excels as well in a multitude of good illustrations. Especially the numerous black and white photographs are of first-rate quality. The varieties recommended and described are not in general those favoured in England.

541. HONIG, P., AND VERDOORN, F. (Editors) 5 (921/923)

Science and scientists in the Netherlands Indies.

Board for the Netherlands Indies, Surinam and Curaçao, New York and Wm. Dawson, London, 1945, pp. 491, \$4 or £1, bibls. Being *Special Supplement Vol. 102 of the Natuurwetenschappelijk Tijdschrift voor Ned. Indië*.

This anthology has been published by the Government of the Netherlands Indies to present a picture of the state and development of a number of branches of the natural sciences, pure and applied, in the Dutch tropical possessions. It consists of original articles on the development of various branches of science in the Netherlands Indies, reprints of similar accounts previously published elsewhere and now translated into English, travellers' tales and impressions by distinguished visitors of the past and number of shorter articles, biographical sketches and the like. The volume concludes with a list of scientific institutions, societies and workers in the Netherlands Indies at the time of the Japanese invasion. The illustrations are many and delightful, often being reproductions of early drawings of the life of the countryside as seen by the pioneers. There are no less than 75 contributors of distinction, each of whom could profitably be the subject of a separate review, but it is only possible to select for comment a few of those who treat of subjects of special interest to this bureau. C. J. Bernier (pp. 10-5) gives, in French, a history of the famous Botanical Garden at Buitenzorg and its allied institutions of applied botany. It is mainly concerned with the work of Treub, a Swiss who took up the post of Director in 1883 and remained for 30 years. G. E. Coombs (pp. 48-54) describes the organization devised by the International Rubber

regulation Committee for the conduct of research and propaganda. An appendix tabulates the lines of research, etc., allotted to the participating countries. A particularly interesting article is that by C. Coster (pp. 55-9) on the work of the West Java Research Institute in Buitenzorg. This paper first appeared in the *Empire Journal of Experimental Agriculture*, 1942, 10: 22-30 (see *H.A.*, 12: 619). David Fairchild (pp. 79-99) contributes some characteristic and welcome light comedy in "An American plant hunter in the Netherlands Indies", but however light the touch the sterling work accomplished by this most renowned of American plant acclimatologists cannot be disguised. A voice from the past is that of the Englishman, Henry Forbes (pp. 104-122), sometime Director of the Liverpool University Museum, who, writing in 1885, describes a botanical journey through the West Java province of Bantam in conditions probably far more primitive than those obtaining now. The history of *Cinchona* in Java from the initiation of its culture in 1829 to the present day is dealt with in a series of papers each by a different author (pp. 181-207) and will pay close study, particularly as regards the large-scale propagation methods which have proved so successful there. Phytochemical research in the Netherlands East Indies for the 50 years up to 1938 is covered in two articles by D. R. Poelhaas (pp. 207-17), the first of which is devoted to the facts and achievements of the Dutch and the second to the work of some 25 visitors from abroad over the same period, with a brief note on the nature of the investigations carried out by each, but no word as to the results. Much may be learned from T. A. Tengwall (pp. 344-51) on rubber cultivation in Java in his historical outline of the gradual changes in technique in the plantations and the conditions which have brought them about. There are also many other papers of exciting narrative on plant exploration, on bird and animal life and on other aspects of natural history, besides some considerably stiffer ones on geology, climatology, population density and other matters for the specialist. If not of popular appeal, at least of human interest is the original paper in which F. Weidenreich (pp. 380-390) discusses the aims of the Javan *Pithecanthropus erectus* to be a direct ancestor of the human race and shows how in Java, to quote Sir Arthur Keith, "a series of remains has been discovered which begin as ape-men and end in the aboriginal of modern Australia". Some may now think that Nature's mistake was in not allowing the matter to remain at that. It should be mentioned in conclusion that the serious papers in this very readable book possess comprehensive bibliographies. There is, however, no index, and this again we like hardly. We note, we hope without bitterness, that the ravages of peace seem to have left American publishers unscathed. Print, paper, binding and the general "de luxe" appearance of the book are fully equal to any wartime U.S.A. publication, that is to say quite first class.

G.ST.C.F.

42. HORSFALL, J. G. 632.952
Fungicides and their action.
 Chronica Botanica Co., Waltham, Mass., and
 Wm. Dawson, Lond., 1945, pp. 239, \$5, bibl.
 23 pp.

It should be stated at the outset that this book is written by an American for Americans, for this explains much, including the fact that it is written in American. In consequence, its words and phrases often ring strangely in the ear of anyone accustomed only to the relative austerity of British scientific writing. It must be confessed, however, that, once the shock of immersion in an unfamiliar language has been overcome, the effect is to keep the text alive in a manner not often accomplished in technical works. Only rarely does the reader feel that the author really has gone too far in his quest for the striking phrase.

There was need for a book devoted wholly to fungicides and aiming at depth rather than breadth. Within his chosen field the author has made a comprehensive survey of the

literature, both historical and current, and seasoned it with items from his own wide experience. He is, however, somewhat prone to dismiss as impracticable or unsatisfactory, procedures and techniques of which he appears to have little first-hand experience. Many workers would join issue with him in respect of some of his pronouncements such, for instance, as his assertion that *Venturia inaequalis* is not a satisfactory test organism because it "sporulates very poorly in the laboratory".

Not the least service Dr. Horsfall performs is to shake the complacency that arises from a too easy approach to the problems of evaluation of fungicides. His discussion and analysis of the pitfalls that beset both laboratory and field methods of bio-assay are timely and salutary. The treatment of the quantitative aspects includes a useful interpretation of the contribution made by statistics to the solution of these problems. Of particular interest, too, is the account of attempts to apply the modern dosage-response technique to the examination of the field performance of fungicides.

Dr. Horsfall is less happy when he discusses the more purely chemical aspects of toxicity to fungus spores. Especially when dealing with synthetic organic compounds he is manifestly skating on thin ice and ominous cracks appear from time to time. It is difficult sometimes to escape an impression of what the author himself calls a trip through the reagent catalogue. He is, moreover, guilty of the error of over-simplification, against which he warns the reader in the section on biological considerations. As one result of this, hypotheses are frequently advanced on the basis of the observed toxicity relations between two or three substances. It is seldom difficult to elaborate speculative hypotheses, provided sufficiently few data are considered. One suspects that the author has looked too long upon organic structural formulae drawn conventionally in one plane, for nowhere does he consider the possible significance of three-dimensional configurations. In this section there is, too, a looseness of expression and definition that a chemist, at least, finds more than a little disturbing, and some errors of fact are evident. Two examples out of a number that might be cited are the statements that Sulsol, one of the best-known elemental sulphur products, is a preparation containing tetramethylthiuram disulphide, and that this last-named compound was first described by Tisdale and Williams in 1934. Neither statement even approximates to the truth. Despite these regrettable faults, this section contains a wealth of information otherwise accessible only with difficulty. It can best be assimilated, however, by being taken in relatively small doses. There is a valuable, if somewhat sketchy, chapter on chemotherapy, and, if the reader is not overwhelmed by words and then more words in the first two pages of the chapter on antagonism and synergism, he will find some very interesting ideas summarized therein. In other chapters the investigation and significance of "Deposition", "Coverage", and "Tenacity" are dealt with competently, though it would not be unjust to say that here, as elsewhere in the book, more than due emphasis is placed on laboratory, as opposed to field, methods. A chapter on "Phytotoxicity" concludes the text. An extensive bibliography includes some 500 references.

It was the reviewer's intention to make this notice a favourable one. That it has, in fact, developed along somewhat critical lines is no discredit to Dr. Horsfall's book. Rather is it a tribute, in the main, to the author's fresh and provocative approach. No worker interested in investigation of the properties and performance of fungicides should rest content until he has read this book and been annoyed—and stimulated by it.

H.S.

543. MASSEE, A. M. 632.6/7: 634.1/7 + 633.79
*The pests of fruits and hops.**
 (Second edition.) Crosby Lockwood & Son
 Ltd., London, 1945, pp. 283, 21s.

The appearance of Dr. Massee's book in 1937 was welcomed

* Now out of print.

by all who are interested in the production of clean fruit whether grown under commercial conditions or in gardens. Applied entomologists are under an obligation to the author for bringing our knowledge of fruit pests to date, for there had been an interval of nearly thirty years since the publication of the late Prof. Theobald's book on *Insect Pests of Fruit*, and great advances had been made both in our knowledge of fruit pests and in the methods of controlling them. It was not unexpected that a second edition of Dr. Massee's book should appear, but it will be a disappointment to many to learn that this edition is already exhausted owing to the demand for a textbook that is written by so eminent an authority being far greater than the supply. While the present volume is less bulky than its predecessor, the price is advanced to 21s. owing to the higher costs of production. The general format remains the same, and the excellent series of photographs by the author's one-time colleague, Dr. R. M. Greenslade, will enable the reader to identify many pests from their portraits and from the nature of the injury done. There still remains the invaluable chapter on Spraying Equipment by Mr. J. Turnbull.

Advances continue to be made in this as well as in other biological fields, and the addition of an Appendix (pp. 267-269) was found necessary to include a paragraph on dinitro-ortho-cresol emulsion, together with notes on more effective control measures against such pests as the codling moth, pear midge, hop red spider mite, slugs and snails, and the strawberry aphid. Additional notes here and there in the text bring the information concerning certain pests up to date, but further emendations are clearly indicated and additional references desirable, and these we trust will be made in the third edition.

One would have wished, for instance, that reference had been made to other topics, notably to thiocyanate washes as ovicides, to DDT dusts as effective against the apple blossom weevil, and to pollinating insects—hive bees in particular—in the chapter on Beneficial and Harmless Insects.

An additional Appendix in the next edition might well be the inclusion of a Spray Calendar similar to the one issued in 1942 by the East Malling Research Station, for thereon is presented in a praiseworthy simple manner the minimum number of applications essential for the production of clean fruit. G.F.-W.

544. MIČURIN FRUIT RESEARCH INSTITUTE.

632.111: 634.1/7

Frost damage to orchards and its repair.

[Russian.]

Published by Mičurin Fruit Research Institute, Seljhozgiz, Moscow, 1944, pp. 136, bibl. 66, roubles 2.50.

During the years 1938-1942 meteorological conditions in the middle regions of the U.S.S.R. were very unfavourable to fruit trees in general.

The winter of 1939/40 was especially severe. The absolute minimum in January 1940 was -53.5°C , a temperature never before noted there. The mean monthly temperature in January was -19.3°C (i.e. the normal January temperature in North Urals and Siberia). The winter 1940/41 was also severe. The result was widespread injury to fruit. Investigations covered both the internal conditions of trees and the external conditions (microclimate, etc.).

The resistance to frost of different Russian and North American varieties was classified in four groups. The "most resistant" group contains Kitajka (*M. prunifolia*), the Mičurin varieties Tajoznoje, Kitajka anisovaja, etc., but no American varieties; the second group, "resistant", includes Antonovka, Borovinka, several Mičurin varieties and Wealthy and Anoka; the third, only "moderately resistant", includes the American Lobo and in the "least resistant" group are Lithuanian Pippin, Fameuse and McIntosh.

In rebuilding orchards the following plan was observed:—

When very few trees remained alive the orchard was replanted and planted accordingly. When more than 50% of the trees were killed and the rest injured, the new trees were planted in between the old. When the tops of trunks 20-30-year-old trees were frozen, root grafting was advised. When only the 1-year shoots were killed the trees were pruned lightly. Where damage was more severe, so was the pruning. Where the top was frozen dehorning was done; when not only the top but part of the trunk was killed the tree was headed back and a new top formed in the low trunk. The wound was smeared with grafting and the trunks sprayed with milk of lime. In case of spring drought the application of water to the injured trees was advised.

In order to maintain a good cover of snow the filler trees and bushes were interplanted with varieties which were early-bearing and resistant to frost, special attention being given to the Mičurin varieties. The general plan was to replant with horizontally trained trees, as are used in Siberia to ensure snow cover in winter. W.F.

545. SEABROOK, W. P.

634.1/7

Modern fruit growing.

(Seventh edition.) Ernest Benn, London, 1945, pp. 307, 10s.

Owing to the great demand for this book, the sixth edition (*H.A.*, 15: 920) which appeared a year ago went out of print in a very short time, thus affording an opportunity for revision. The short interval of time has apparently been inadequate for a "complete revision" but the author has attempted to keep his book up to date by inserting notes mainly at the end of chapters, where little disturbance was caused to paging. We consider the most useful addition to be notes on the Certification Schemes of the Ministry of Agriculture, apple blossom weevil control and spray prevent pre-harvest fruit drop. The deletion of a paragraph on the use of wild white clover as a permanent sward is a useful revision. Improvements in presentation include removal of the untidy background to fig. 4 and the correction of the captions for figs. 13 and 14. H.B.S.M.

546. SMITH, K. M.

632.8: 634/635

Virus diseases of farm and garden crops.

Littlebury, Worcester, 1945, pp. 111, 10s. 6d.

The crucial importance of plant virus disease to production of many agricultural and horticultural crops and to gardeners is now generally recognized by these industries. This is certainly due in part to the considerable advances in our knowledge of them and may even reflect an intensification of their onslaught. Be that as it may, the present volume claims, with good reason, to meet a growing need for a textbook treating of virus diseases from the point of view of the practical grower and of his advisers. Vital information on their identification and control hitherto scattered through an extensive literature embedded in masses of data on the nature and properties of the viruses themselves, is here gathered together in convenient format,—one of the better examples of wartime book production.

Because viruses are ultramicroscopic and cannot be cultured outside their living host-plant, diagnosis must largely depend on the plant symptoms produced. The special technique of identification by means of indicator plants, using grafting, mechanical or insect modes of transmission is therefore described in Chapter I.

Chapter II enlarges on the subject of insect transmission, concluding with a brief, non-technical description of important vectors in the British Isles and a list of the diseases transmitted by each. The descriptions of vectors are supplemented in an appendix by an admirable series of drawings by Miss Margaret Short.

The remaining seven chapters deal with the diseases themselves grouped under their host-plants as follows:—Potato; Root-crops; Pulse and Pasture Crops; Vegetables; Solanaceous Fruit and Hops; Ornamental Plants; and Medicinal Plants.

d Weed Hosts. The causal virus or viruses of each disease or composite disease are clearly distinguished, as far as present knowledge allows, thus displaying the relations between diseases having viruses in common. Succinct descriptions of symptoms are followed by a summary of the best information on practical control measures and each chapter concludes with a select list of references to the relevant scientific papers. The textual descriptions of symptoms are further supplemented by sixteen plates of excellently chosen and reproduced photographic illustrations of ready reference is ensured by a table of contents and an index. The book is eminently readable throughout and finishes the grower and the adviser in plant diseases with handy everyday *vade mecum*.

Evitably in the first edition of such a work, minor errors and omissions are to be found, and apropos of the diseases of fruit (Chapter VII) the following may be worth noting. It must be regretfully disclaimed (p. 69) that East Malling Research Station has still available an almost virus-free one of Lloyd George raspberry. There are, however, two or three exceptionally vigorous sources of supply elsewhere which, because careful propagation is effected in relative isolation, contain only comparatively innocuous virus. Finally (p. 72) the strawberry aphid, *Capitophorus fragariae* neob., has been conclusively shown to transmit strawberry mottle (Massee, 1942, *J. Pomol.*, 20: 42-8). A description of this important aphid might usefully be added to future editions.

R.V.H.

7. WORMALD, H. 632.1/4: 634.1/7 + 633.79

*Diseases of fruits and hops.**

Crosby Lockwood & Son, London, 1945, pp. 294, plates 50, text figures 24, 21s.

This is largely a reprint of the first issue (see *H.A.*, 9: 352). A few alterations have been made from the original text and, together with 7½ pages of addenda, bring the book more up to date. The addenda supply further information on some of the diseases mentioned in the body of the book and also to outline work and observations on plant disorders and diseases, carried out mostly at the research stations at East Malling and East Malling, during the wartime years. The new subject matter mainly concerns the following:—General deficiencies in fruit trees; perennial canker of apple (recently recorded for Britain); dry eye rot of apple; two serious diseases of fruit trees; *Verticillium* wilt of plum; curl disease of raspberry; strawberry leaf blotch; drop of cobnuts; black root rot of hops, and the more recent work on strawberry red core and on hop canker. The plates are of the same pre-war high standard of the earlier issue, and although the increased cost of reproduction has made necessary an increase in the price, commercial growers, advisory officers, horticultural students and gardeners (professional and amateur) will find the book well worth the money, for they will see there much that is of practical interest and of practical value.

8. AALSMEER. 635.9

Jaarverslag Proeftuin voor Bloemeteelt te Aalsmeer 1942. (A.R. Aalsmeer Res. Stat. for Flower Culture 1942.)
Aalsmeer, 1943, 12 pp.

Contains notes on various experiments carried out at the Aalsmeer experiment station on various physiological and pathological aspects of the cultivation of ornamental plants; among others are mentioned: the influence of artificial illumination on begonias, treatment of begonia cuttings with growth substances, infestation of begonias with the beetle *Tarsonemus latus* Banks, the bark borer of *Prunus loba*, sawfly of roses, and chlorosis of roses.

9. AALSMEER. 635.9

Jaarverslag Proeftuin voor Bloemeteelt te Aalsmeer 1943. (A.R. Aalsmeer Res. Stat. for Flower Culture 1943.)
Aalsmeer, 1944, 48 pp.

* Now out of print.

As in previous years this report includes notes on various experiments on ornamental plants at the station. Special attention is given to composting soil for cyclamens (see No. 401).

550. ALGÉRIE (REBOUR, H., AND OTHERS). 634.1/8(65)
Comptes rendus de l'expérimentation fruitière en Algérie 1943 et 1944. (Report on fruit investigations in Algeria 1943 and 1944.)
Doc. Rens. agric. de l'Algérie, Bull. 118, 1945, pp. 32.

Most of this is devoted to observations made at different places on the flowering of the Clementine orange in an attempt to throw light on the not infrequent problem of its unfruitfulness. The abnormalities in flowers noted in many places are here illustrated and discussed. In the neighbourhood of Perrégaux the mandarin is a much better pollinator of the Clementine than are other oranges, the disadvantage being the slight flavour given to the resulting fruit. Mauri discusses the Navel character and its more frequent occurrence in other oranges since the introduction of navel varieties. He considers that planting mixed populations of oranges is conducive to the occurrence and should be avoided. Observations indicate that at Boufarik the most paying orange crops are the Clementine, Biskra and Portuguese blood oranges and Washington navels. Thomson's navel and the Blida orange are not so good. Not very encouraging notes deal with choice of deciduous fruit varieties for hill districts. Fig drying trials showed that the best quality dried figs were obtained by drying on hurdles in the sun for 5 hours and then piling the hurdles one on top of another in the open to complete the process.

551. NATIONAL RESEARCH COUNCIL OF CANADA.

633/635

Twenty-eighth Annual Report of the N.R.C. Canada for 1944-45.

(N.R.C. 1342), 1945, pp. English 40, French 43.

Horticulturists will be interested in the following items reported briefly in the report of the Division of Applied Biology:—Plans and specifications are prepared for the building of a new laboratory to study the industrial utilization of agricultural wastes at Saskatoon. Work continued on the extraction of rubber from native and introduced plants and on extracts of Irish moss. The Division of Chemistry reports investigations on the identification of alkaloids from *Lycopodium* and *Sedum*.

552. CEYLON.

633/635(548)

Administration Report of the Acting Director of Agriculture, Ceylon, for 1943, 1945, pp. 18, 40 cents.

Entomological investigations. These concerned control measures, biological and other, of the coconut caterpillar (*Nephantis serinopa*) and fruit piercing moths (*Othreis* spp.). *Plant pathology.* Attempts to cure an exanthema-like disease of young citrus at Peradeniya by cultural methods were unsuccessful. *Chemistry.* Trials on citronella show the benefits to be derived from applying a general manurial mixture, the chief need being for P_2O_5 and K_2O . *Botany.* Nearly 30,000 seedlings of *Cinchona ledgeriana* were raised at Hakgala. Stem bark analyses of 2-year-old plants showed that *ledgeriana* had the highest and hybrid the lowest total alkaloid content, *succirubra* being intermediate. Successful trials are reported with castor bean capsule shelling machines. Seed from papaw of high papain yield has been sown. Commercial seed production has been achieved of the following temperate vegetables: cauliflower, radish, rhubarb, celery and lettuce. *Horticulture.* Rough lemon has proved an invigorating stock for all varieties of grapefruit (8), sweet orange (7), mandarin (4) and seedless Tahiti lime. Reaction to sour orange has varied, the varieties found most compatible being local orange and Nagpur Santra mandarin. Four varieties of mango have

shown compatibility with 4 different stocks. Palu (*Manilkara* or *Mimusops hexandra*) has proved a better stock for sapodilla (*Achras zapota*) than Mee' (*Madhuca* (*Bassia*) *longifolia*), which tends to outgrow the scion and cause it to die back.

553. COLONIAL OFFICE.

633.74

Report of proceedings of the cocoa research conference held at the Colonial Office London, May-June 1945, 1945, pp. 168, 3s.

Abstracts of the paper presented at this conference have already appeared in *H.A.*, 15: 1259-1285. Here will be found the full papers, a summary of recommendations and the proceedings and, in addition, a paper by T. N. Hoblyn on the design of field experiments with cocoa (see No. 470).

554. CYPRUS.

634.1/8(393)

Annual Report of the Department of Agriculture Cyprus, for the year 1944, 1945, pp. 8, 1s.

In vegetable seed trials cauliflowers failed but onions and leeks did well. Trials of fruit varieties and stocks have been established at the Deciduous and Small Fruit Station, Trikoukia. More land is wanted. Experimental work on wine and raisin making was continued at the Viticultural Station, Saïta.

555. INDIAN TEA ASSOCIATION.

633.72(541.2)

Annual Reports of the Indian Tea Association (Scientific Department) Toklai for 1943 and for 1944, 1944 and 1945, pp. 4 and 11.

Lack of staff has restricted operations considerably. It was found that both time of pruning and the time at which cuttings were taken from tea bushes considerably affected the growth of the cuttings, the least satisfactory time for taking them being the cold weather from December to February. A correlation has been established between a direct estimation of starch in tea roots and the coloration of the cross section of the root by iodine, which proves a useful qualitative and quantitative test. As regards red rust (*Cephalosporium parasiticum*) a 30 lb. per acre application of P_2O_5 resulted in less red rust, whereas larger applications were ineffective, the best results, especially in the susceptible light leaf jats, following the use of nitrogen. Experiments show that at Toklai the application in the very early years of 20 lb. N, 60 lb. K_2O and 30 lb. P_2O_5 per acre can be recommended. After the fourth year the N can be increased and the potash decreased. Combined shade and manuring trials indicate that the most efficient use of manures is to apply them to unshaded areas. In the 1944 report it is noted that lighter plucking allowed new leaf to remain on the new year's stems during the plucking season and resulted in improvement with regard to red rust. No difference could be seen in health between plants raised from seed and those raised from cuttings. Raising from cuttings has now proved so successful that in-filling of trial plots is now done with plants from cuttings taken from bushes in the plots. The Mycologist reports work on the control of black rot caused by *Corticium morsum*. In the Advisory Branch Report for 1944 details are given of results of shade and manurial trials.

556. I.N.E.A.C.

633/635: 551.566.1(675)

Rapport pour les exercices 1942 et 1943. (Report on experimental work of I.N.E.A.C. Stations.) Institut national pour l'étude agronomique du Congo belge, Leopoldville, 1944, pp. 153, 50 francs.

Printing difficulties again restricted this report to very brief statements on the numerous activities of the institute in different parts of the Congo, which were themselves largely devoted to the war effort. In this connexion the output of Hevea rubber nearly doubled between 1941 and 1943. Throughout the report it has not been possible to do more than express bare facts and in some cases to make recommendations. Few experimental data are given. The

following are a sample of the work reported:—Control of *Asterolecanium coffeae*. At Mulungu selection of *Coffea arabica* for resistance to *Colletotrichum coffeanum* continues. *Armillaria* causes trouble in cinchona and attempts—girdling before felling forest trees—are being made to deal with. Resistance of cinchona to *Helopeltis orophila* is under examination. Selection work and pollen examination continues with regard to the oil palm *Elaeis guineensis*. Work on hevea consists of clonal selection, of tests of optimum size of planting material, of shade trees, of methods of culture, of burning over, clearing and tapping. In control of the superiority of multistem to single stem pruning is clear established. *Albizia moluccana* has proved an excellent shade tree—incidentally it also seems to suit cacao. Cultivation studies on Forastero and Criollo-Forastero continue. Considerable attention is being paid to methods of laying out experiments, the methods which show most promise being that of Papadakis, i.e. Co-variants with yields of adjacent plots, and that of Systematic control. The Division des Plantes Vivrières is working on banana (it has a collection of 9 different seeded varieties), *Cacaya jobi*, sweet potato, cassava, *Cajanus indicus*, filberts, especially *Urena lobata*. Very brief accounts are given of results of work at the various experimental centres on most of the plants mentioned above and others including essential oil plants. From Mulungu work is reported on coffee, cinchona, pyrethrum, tea, market garden plants, essential oils, tobacco, etc. From the Lower Congo work on fruit trees, bananas, citrus, pineapple, mangoes, etc. is reported from the experiment station at Vuazi. Other reports concern cotton, other fibres and other tropical crops.

557. INSTITUUT . . . VERWERKING FRUIT GROENTEN.

634/635 + 664.84/85

Verslag over 1940 Inst. Onderz. Geb. Verwerk. Fruit Groenten, Wageningen. (A.R. Inst. Fruit and Vegetable Products, Wageningen, for 1940.) Wageningen, pp. 93.

This is a general review of the activities of the institute during 1940, followed by a report on the projects under investigation. The following subjects are treated in some detail: An investigation of quality in varieties of red and of white currants; history of the propaganda for fruit juice; Holland and the analysis of the sale of the products of trials in 1932-40; drying fruit and vegetables; investigation on the behaviour of vitamin C in fresh products and during its preparation.

558. INSTITUUT . . . VERWERKING FRUIT GROENTEN.

634/635 + 664.84/85

Verslag over 1942 Inst. Onderz. Geb. Verwerk. Fruit Groenten, Wageningen. (A.R. Inst. Fruit and Vegetable Products, Wageningen, 1941.) Wageningen, 1942, pp. 26.

In this report for the year 1941, special mention is made of storage investigations (including the influence of growth substances on the ripening of apples in store), the preparation of wines from certain fruits, a description with drawings of an apparatus for drying fruit (experiments with apples) and a study of the vitamin C content of various garden products.

559. INSTITUUT . . . VERWERKING FRUIT GROENTEN.

634/635 + 664.84/85

Verslag over 1942 Inst. Onderz. Geb. Verwerk. Fruit en Groenten, Wageningen. (A.R. Inst. Fruit and Vegetable Products, Wageningen, for 1942.) Wageningen, pp. 43.

A general review of the work of the institute for 1941 followed by two articles, one on the manuring of more cherry trees, and the other on the constituents determining quality in fruit and vegetables (see Nos. 83 and 518). It may be noted that Ir. A. K. Zweede became director of

stitute in place of Prof. A. M. Sprenger retired from January, 1942.

10. "DE LANGE OSSEKAMPEN." 634.1/7-1.8
Jaarverslag van de werkzaamheden in het jaar 1942.
Centrale Bemestingsproefveld voor de Fruitteelt
"De Lange Ossekampen". (A.R. Lange Osse-
kampen manurial trials in 1942.)
Wageningen, 1942, 48 pp.

This report for the year the lay-out of the central manurial field for fruit culture, "De Lange Ossekampen", is described and illustrated by photographs and plans. The yields of trees on manurial and rootstock trial plots are set in tables.

1. LAUSANNE (FAES, H., AND OTHERS). 634.1/8(494)
Rapports annuels 1943 et 1944 de la station
fédérale d'essais viticoles et arboricoles à Lausanne
et Domaine de Pully. (Annual reports for 1943
and 1944 of the Federal Viticultural Research
Station of Lausanne and Domaine de Pully.)
Landw. Jb. Schweiz, 1945, 59: 671-707.

1943, a Federal Substation for Fruit Growing was established in Valais as a branch of the Lausanne Research Station, but Dr. F. Kobel of Wädenswil will be in charge of certain projects. A. Lausanne. *Viticulture*. Efforts are being made to introduce vine varieties for table grape production, which will stand up to transport. Grapes were successfully stored in a hermetically closed, refrigerated glass cupboard containing a weak dosage of sulphurous acid gas. The object of these experiments is eventually to supply the Swiss market at Christmas and New Year with home-grown grapes. Attempts to stimulate root development in rootstocks with hormones have not given encouraging results. Mildew was very effectively controlled with Bordeaux mixture at $1\frac{1}{2}$ and 1% and at $\frac{3}{4}$ % + 0.4% magnesium sulphate, 0.3% Copper Sandoz, 1% Bayer 2317 W + 1% Copper Sandoz, and 1% Bayer 1192 A + 0.2% Copper Sandoz. Against *Coniothyrium diplodiella* infection following hail damage, good results were obtained with liquid quinoline and with a weak copper sulphate solution (0.400 g. per 100 litres water), if applied as early as possible after the hail. Vines on their own roots showed superior resistance to hail than did grafted Chasselas. Higher resistance to copper is a further point in their favour. Fungus spray proved superior to Gesarol (DDT) in the control of *Cochylis* and *Eudemis*, but the addition of a wetting agent to the latter brought Gesarol up to the standard of Nirozan. As a dust Gesarol gave results comparable with those obtained with Nirozan dust. Nicotine plus a wetting agent was also very effective against the second generation of both pests. *Fruit growing*. The activities of the Station in furthering fruit culture in the mountains, breeding and storage experiments, as well as on number of fruit pests and diseases are briefly discussed.

The report of the *Chemistry and Bacteriology* Division deals with various subjects connected with wine production. In this section a report is given of a number of minor agricultural and pomological projects in progress at the Domaine de Pully. Section D. presents a list of classes and conferences held and of publications issued during the period 1943-1944.

2. NYASALAND PROTECTORATE. 633/635(689.7)
Report of the Department of Agriculture of
Nyasaland Protectorate for the year 1944.
Part I. Agriculture in Nyasaland, 1945, pp. 7.

Oil. Acreage under tung continues to rise and improvement is taking place on the old areas as the result of appropriately top working unprofitable male or *fordii* trees. *Persea* is commercially produced now on the Nyika plateau and some promise of success is offered elsewhere. *Pepper*. Disappointing results are reported. *Citrus*. This suffered unusually heavily throughout the Protectorate from the psyllid, *Spanioza erythraea*.

563. NEERGAARD, P. 632.7
8. *Aarsberetning fra J.E. Ohlsens Enkes Plantepatologiske Laboratorium*. 1 April, 1942-31 Martis, 1943. (8th Annual report of J. E. Ohlsens Enkes Plant Pathology Laboratory.) [English summary.] Copenhagen, 1943, pp. 21, from abstract Zbl. Bakt., Abt. II, 1944, 106: 394.

A number of fungus diseases were recorded for the first time in Denmark as a result of an examination of 5,510 samples of horticultural seeds. In a comparative test of seed disinfectants, in which *Godelia hybrida* seed served as test material, a 4-hour treatment with 0.5% Tillantin gave the best results. A study of the problem whether pathogenic fungi excreted substances toxic to the host plant showed that sterile filtrates of *Stemphylium radicum* are very toxic to *G. hybrida* seedlings.

564. TANGANYIKA DEPARTMENT OF AGRICULTURE. 633.526.2 + 678.2/9
Annual Report of the Department of Agriculture,
Tanganyika Territory, for 1944, 1945, pp. 9, 50
cents.

Spacing trials at the Sisal Research Station, Ngomeni Station, indicate the importance of a high plant population per acre and the desirability of clean weeding during the first two years. Results of the fertilizer trials are negative: a report is promised.

565. TUCUMAN (CROSS, W. E.). 634/635(824.5)
Memoria anual del año 1943. (Annual report
of the Tucuman Agricultural Experiment Station
for 1943.)
Rev. industr. agric. Tucuman, 1944, 34: 111-90.

In the section dealing with the activities of general agriculture and horticulture special attention is given (pp. 123-43) to the work carried out on citrus species. The crops of various individual lemon trees are set out in tables I-V, the crops of different varieties on various rootstocks in tables VI and VII, while table VIII shows the crops of individual trees in an orange grove growing at a high altitude without facilities for irrigation.

566. UGANDA DEPARTMENT OF AGRICULTURE. 633.73 + 633.88(676.1)
Annual Report of the Uganda Department of
Agriculture for the period 1st July 1943-30th
June 1944, 1945, pp. 10, sh. 1.

The following items of Departmental work are of interest to those interested in cultivation problems of particular crops: *Coffee*. Kents Arabica is confirmed as the best coffee variety yet tested. The dry weather was very injurious to mature Robusta coffee at Kawanda, the effect being greater on trees interplanted with *Leucaena glauca*, bananas and elephant grass (*Pennisetum purpureum*) than on clean weeded plots or those mulched with elephant grass. Highest yields were got with Robusta, which was thus mulched. *Albizia stipulata* trees planted for shade were even more affected by drought than the coffee trees. *Cinchona*. Further analysis of bark from trees of varying girth supported the theory that the largest trees contain the most quinine.

567. VERBAND SCHWEIZERISCHER GÄRTNERMEISTER. 634/635(494)
Forschungsergebnisse aus dem Gebiete des Gartenbaues.*
ForschErgebn. Geb. Gartenb., 1942, Band 1, Heft 1, pp. 28.

Six numbers of this new Swiss publication have appeared so far. Each number contains several papers reporting full experimental results of investigations in the horticultural sphere conducted at Swiss agricultural research stations. We welcome the series, which will help scientists abroad to

* A new Swiss publication on scientific horticulture published by and obtainable from the Verband Schweizerischer Gärtnermeister, Bern, Switzerland.

follow the progress of Swiss horticulture. Publication is occasional.

568. WÄDENSWIL (MEIER, K.). (494)
Bericht der eidg. Versuchsanstalt für Obst-, Wein-,
und Gartenbau in Wädenswil für das Jahr 1943.
(Report of the Wädenswil Horticultural Research
Station for the year 1943.)*
Landw. Jb. Schweiz, 1944, 58: 891-953.

Many of the research projects covered in this report have been discussed elsewhere and have already been mentioned in *Horticultural Abstracts*. *Fruitgrowing*:—First results of the rootstock trials in progress (see *ibidem*, 1944, 58: 417-95; *H.A.*, 15: 944) are reported in detail. Under favourable conditions standard fruit trees were found to thrive at altitudes up to 1,000 m. (or even up to 1,400 m. in Graubünden and elsewhere) and espaliers up to 1,400 m. Suitable varieties on high altitudes are named. The Spindelbusch (see No. 76), widely advertised in Germany, gave very satisfactory results with apples and pears, where early prolific yields were aimed at. An examination of preparations for the treatment of tree wounds showed that acid-containing chemicals delay occlusion but protect the wood from infection for several years, while acid-free preparations promote initial—as opposed to permanent—healing without giving protection. For investigations into the composition of orchard soils and results obtained in the Wädenswil district, see *H.A.*, 15: 62. In the Aargau, cherry soils on slopes were found to be as a rule acid and very deficient in phosphoric acid and potassium, the boron content being also very low, whereas cherry soils in valleys did not show deficiencies. In other areas of the Aargau and Baselland serious troubles of cherries seemed related to phosphoric acid and possibly other deficiencies. Extensive experiments, carried out from 1939 to 1942, led to the conclusion that cherry flies cannot be controlled by trapping; however, baits containing stearate of ammonium proved very useful as an indicator for the correct timing of sprays. The raspberry pest *Incurvaria rubiella* is described. Its infestations do not occur very frequently and are estimated to cause losses of 10-20%. Spraying with 5% fruit tree carbolineum or 1.5 dinitro-o-cresol in February or March controlled it. *Fruit wines*:—Yeast strains are being selected which are very resistant to sulphur and are capable of fermenting vigorously at temperatures of 5-10° C. *Viticulture*:—Preliminary results obtained with applications of green manure were satisfactory. Intercropping can only be advocated as an emergency measure. Covering the vines with nets impregnated with 6% bordeaux mixture plus one bordeaux application not only gave protection against hail and disease but also improved the quality of

* For Report for 1944, see *H.A.*, 15: 2079.

grapes. Although a very large number of substances tested, fermented must could not be improved upon, bait for *Clysia ambiguella*. The free-living nematode *Criconea rusticum* was found frequently in certain vineyards of vines on their own roots. It remains to be determined whether the nematode should be regarded as a pest. Treatment of wines has also been studied. *Breeding*: Experiments with French beans, peas, onions and strawberries are mentioned. *Chemical*:—A modified method producing frozen canned tomato puree, preventing damage to the colour and aromatic substances, was successfully applied. The juice was separated from the pulp, condensed in a vacuum and again united with the pulp. The water content of such purees was normal. *Engineering*:—Cultivation with electrified hand tractors was found practicable, cheap and easy. The method has been taken up by a large number of growers. Aluminium foils, in addition to coloured glass, are being studied as a means of increasing reflection on espalier walls.

569. ZANZIBAR DEPARTMENT OF AGRICULTURE,
633/635(678.1)

*Annual Report of the Zanzibar Department of
Agriculture for 1944*, 1945, pp. 8, 75 cents.

Manurial trials on cloves continue. It is found that application of manures in the planting holes cannot be recommended. The value of top dressings at a later stage to seedling cloves is proved. Manurial trials in progress are also reported on coconuts and pineapples. Trial of different lengths of cuttings of cassava showed significant results. 12 in. cuttings resulted in better yield than 9 in. cuttings, 15 in. cuttings than 6 in. cuttings and 9 in. cuttings than 6 in. cuttings. Trials indicate that rough lemons are preferable as a citrus stock to sour orange.

570. The following reports have also been examined:

- a *Jaarverslag van de werkzaamheden in het jaar 1939 Centrale Bemestingproefveld voor de Fruitteelt "De Lange Ossekampen"*. (A.R. Lange Ossekampen manurial trials 1939.)
Ditto 1940.
Ditto 1941.
- b *25th A.R. nat. Inst. agric. Bot., Cambridge, for 1943/44*, 1945, pp. 14.
- c *A.R. Field Experiments on Sugar Cane in Trinidad for 1943*, 1945?, pp. 202.
- d Bericht über die Tätigkeit der eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon für die Jahre 1938 bis 1942. (Report of the Zürich-Oerlikon Research Station for the years 1938-1942.)
Landw. Jb. Schweiz, 1944, 58: 347-416.